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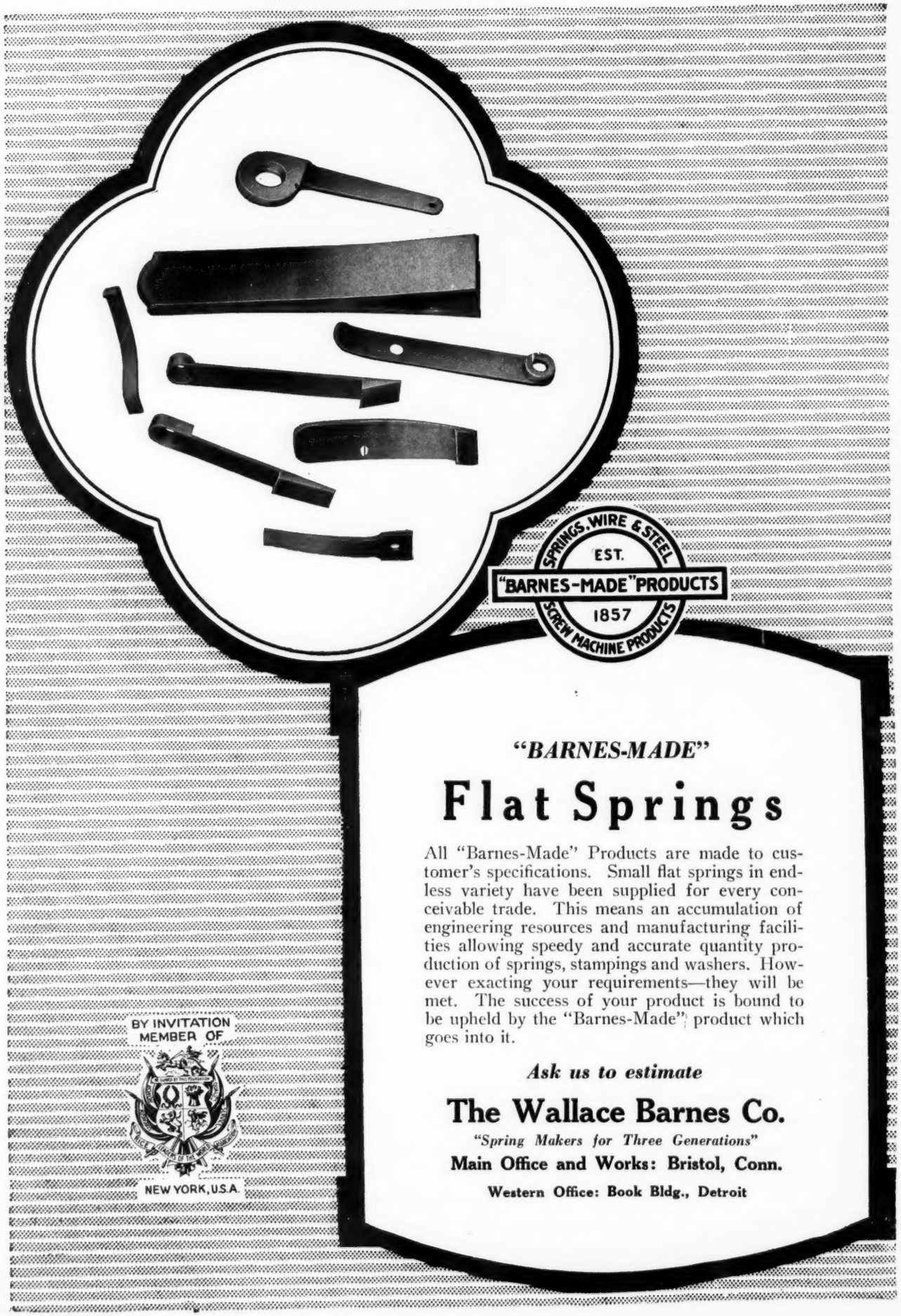

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AUTOMOTIVE INDUSTRIES
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VOL. XLIV. NEW YORK—THURSDAY, APRIL 7, 1921 No. 14

The Crime Against the Small Town Dealer

Present distribution of ownership of automotive vehicles indicates where the dealer problem is the greatest. Factory sales managers have not appreciated this fact. Why neglect 55 per cent?

By Clyde Jennings

THE National Automobile Chamber of Commerce recently issued an estimate of the ownership of automobiles which indicates that 33 per cent of the cars are owned in the towns of less than 1000 inhabitants and 22 per cent in towns of 1000 to 5000. This, of course, represents a large percentage of farm ownership.

Coincident with this comes a report from the Southwest that cites many instances like this:

A Texarkana distributor, representing a good medium priced car, had 18 dealers in 26 counties a year ago and only three have survived.

A Little Rock distributor for one of the leading cars has lost three of his five smaller city dealers.

If these two instances indicate anything like a general fatality among small town dealers it is pertinent to ask who is going to sell the cars in the small cities. Still more pertinent might be the question as to **who is going to service and supply parts for the cars already sold**. It seems that this service question will not down, and any experienced automobile salesman will tell you, without hesitating, that unserviced cars are an exceedingly strong sales resistant.

Still another complaint is frequently heard from the West. It is that many companies are inclined to treat the small town dealership as a good deal of a joke. For instance:

Numerous cases are reported where a local banker has been named as dealer for a certain car. This banker wanted a car for himself and one for each of his several friends. He gets himself named as the dealer, gets the dealer discount on the wanted number of cars, sells them to his friends at a very mild profit and then shuts up shop as a dealer.

The result is that within a comparatively short time these cars **become orphans and will not take the road when they are wanted.** As a result, the owners and their neighbors place the blame entirely upon the manufacturer, for, of course, their profit-evading stunt was not bad business in their eyes. The matter of business ethics does not appeal to them.

Now, really, is it not right and just that the manufacturer should take the blame for oversight of decent business methods?

It is not by any means a new statement that a manufacturer will:

Spend a lot of money getting a proper design of the article that he is to manufacture, then spend a lot more money perfecting the best method of making this article and then

Dump it on the market without any study of the market or,

Without any definite policy of marketing it.

Only such foolishness as this can explain some of the stunts similar to that of letting a banker supply himself and friends with cars at dealer rates.

There has been, is and will be for all time to come

more or less academic discussion as to who is to blame for the disastrous experiences of small merchants, not only in automotive products, but in other lines.

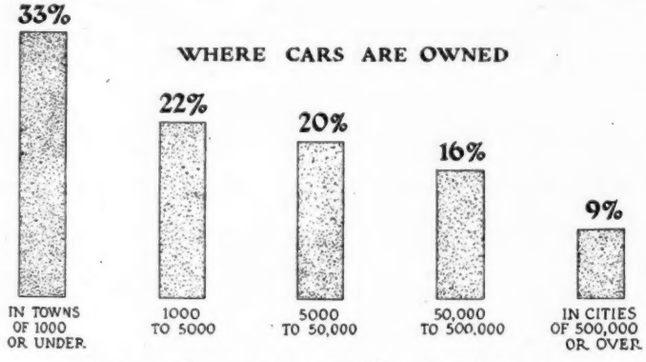
This discussion is practically useless if one will take time to consider only briefly the broad justice that should govern business. It is an axiom that none can successfully dispute that:

A business contract is helpful only in that it benefits both parties to the contract.

Certainly no manufacturer of automotive products can afford to go about the country establishing dealers in small (or large, for that matter) towns who cannot make a living and who, after they have made a few sales, will go broke and leave this equipment standing in sheds just like so much junk. Automotive equipment is much too valuable to be deserted when the first accident happens to some minor part—and yet the country is spotted with just such junk piles.

It is plainly the duty of the manufacturer to insure that his dealer can and will make a living. If the individual established in trade is found to be lacking in the qualities necessary to conduct such a business, then another individual should be substituted, but the business should go on and make a profit for the person in charge.

It has been a mistake to insist upon exclusive representation down to the point that this has been the practice. If the community will not buy enough Sennett cars to make a living for the dealer, then let him add the Rolls-Royce or some other car for a side line, but insist that he provide adequate service for the number of cars in his vicinity.



Analysis of present ownership of registered automotive vehicles published by National Automobile Chamber of Commerce, based on a survey made by J. M. Gunn, president of U. S. Tire Co.

It is a fact to-day that a number of car manufacturers will establish a dealer in a more or less isolated community and not talk to him about parts until after he has sold several cars. It is quite likely that this man, especially if he is a novice, as so many dealers have been at the time they first signed dealer contracts, will not have thought of the necessary investment in parts, at least he will have no idea as to how much parts cost in sufficient number to safeguard his cars.

It is fortunate that this method of establishing dealers is less frequent than formerly, but it has not disappeared, nor will it disappear as long as there are adventurers in the vehicle manufacturing field, nor as long as manufacturers put all of their attention onto the designing and production of cars, and consider the marketing incidental.

To-day many men are made factory sales managers because they have been successful individual salesmen. That is not the test.

Perhaps they sold successfully, so far as total sales were concerned, but sold wrong so far as future was concerned. Time was when salesmen changed employers very often. In many cases it was because they had worn out their welcome. In some cases these very men have used their long list of former employers and their total sales in short periods with each as the means of getting a factory job, when, in fact, that record was the very reason they should never have had an opportunity to get an executive sales job or any other kind of a selling job.

There is no valid reason why almost any hamlet in the United States should not support a progressive, intelligent automotive dealer—provided he combines the selling of differently priced cars with service and accessory selling. Why not add the motorcycle to his list of products for sale? Some time ago a motorcycle concern did seek to interest small town dealers in cycles, but eventually they gave it up. The dealers had no special encouragement to round out their line; if anything, the car influence was against their branching out. If the car influence had been otherwise, the motorcycle manufacturers would probably have succeeded.

It appears to have been a mistake to have encouraged the small town dealer to undertake the sale of trucks. He can sell the delivery wagon type—which is much like passenger car sales—all right, but when it comes to the slow-moving vehicles he does not seem to have been able to measure up. He has not been able to analyze his customer's need for transportation, which must be the keynote of successful truck selling. Besides, until truck transportation is better understood, a small community cannot absorb enough trucks to support an active dealer.

As to tractors, the evidence is very spotted. It seems to be a case of individuality rather than of location, previous experience or environment. Some small town automotive dealers sell tractors like the country merchant buys eggs; they just naturally understand the tractor problem. These men, of course, are successful even if they only sell a few tractors a year, because they estimate the possibilities of their communities fairly accurately, make money on each vehicle and then make service an asset rather than a liability.

There is a very great difference in the attitude of elements of the automotive personnel toward their business representatives. During the last winter J. D. Dort made the dealer circuit and met and talked with every dealer who wanted to talk to him. The comment that this action caused is evidence of the unusual character of such a course. In contrast we will here print some comment that originated in the sales department of an automobile manufacturing company. It is self-explanatory:

> To quote a specific instance—a certain dealer in a given locality writes to the sales manager of one of the large corporations, complaining about his low car discount, stating that he discussed this at length with his distributor, but in vain, and now appeals to the factory for a fair deal.
>
> The sales manager never sees this letter.
>
> It is sorted out in the morning by one of the lesser mail clerks, who passes it on to one of the zone correspondents, and he, in turn, forwards it to the field man, who is requested to look into this matter at his convenience.
>
> Sometimes the correspondent acknowledges the dealer's letter. Other times he does not think it is worth while, depending largely on his mental attitude at the time the letter is placed on his desk.
>
> The field man places the letter from the zone correspondent in one of his many folders and if he is a systematic and aggressive sort of a fellow he so

arranges his files that this letter will come to his attention upon his next visit to the distributor's place of business, which may be within two weeks or **two months.**

When he finally arrives at the point of discussing this with the distributor the subject has grown cold, and at the very best all he can hope to get from the distributor is that the dealer is only a small town fellow, not worthy of any particular investigation.

In other words, the field man gets the distributor's side of the story and the matter is dropped there. He reports to the factory accordingly.

But what about this poor little dealer out in the "sticks" who probably doesn't write more than two or three letters a week and has been waiting anxiously for some word from the manufacturer that would make him feel he was really worth while in the organization. Days, weeks, finally a month passes without even an acknowledgment.

How would you feel if you were that dealer? Draw your own conclusions. Further elucidation is unnecessary.

The man who contributed this illuminating information was presenting the idea that this system did not prevail at the Elgin Motor Car Corp. and we are glad that it does not. It is not good business, but it is exactly what does prevail wherever an attempt is made to organize a system to function in matters where only the spirit behind the action can adjust the situation.

This is merely one of many phases of the situation that could be brought to bear to explain why the small dealer is not up and going.

Here is another contribution. This is from a man who has made a study of selling. He writes:

> One of the mistakes frequently made by manufacturers is to assume that they know all there is to know about the business. Recently a well-known truck manufacturer held a conference of dealers and told them how the merchandising effort was to be carried out during the coming year.
>
> One of the older dealers was then called upon to express his views on the subject. This man, who had been in the automobile business for nearly twenty years, and knew something of both manufacturing and retail selling ends, began by saying that he objected being told exactly how to do everything by someone who perhaps did not know as much about the business as he himself did.

The manufacturer can, of course, be a great help to the dealer in many ways; he can assist him in his merchandising efforts; he can offer helpful suggestions. But he cannot always assume that the dealer is a novice in merchandising methods and practice. It is undoubtedly true that many dealers to-day hold a really big conception of the automobile industry and are impressing their capabilities and their industry upon their respective communities in a very favorable light.

One really constructive piece of work was accomplished a few years ago by a distributor who had some southern states in his territory. He found that this territory had not been educated to pay the price for a car that his vehicle must sell for. So he decided to feed that territory on used cars.

He arranged his own repair shop to turn out overhauled cars and these he shipped into this territory. They were sold with certain guarantees and in opposition to cars of considerably less value as new cars. This trade thrived and had the advantage of clearing the distributor's best new car territory of used car problems.

After two or three years of this work this southern territory developed into a fine new car territory. Of course a distributor who would do this sort of a thing encouraged proper service.

A New Test for Motor Fuels

IN Europe considerable use is now made of blended fuels comprising members of the paraffin group (pentane, hexane, heptane, octane and nonane) on the one hand, and members of the benzene group (benzol, toluol, xylol) on the other. When buying such fuels in large quantities it is, of course, desirable to have some means of checking the composition of the fuel, especially as to the proportion of these two groups of components. This can be done by means of a refractometer, as the paraffin series has a higher refractive index than the benzene series. The Abbe refractometer, made by Adam Hilger, Ltd., is specially recommended for this purpose. The refractive indices of liquids give valuable information concerning the purity of oils and other substances, and the strength of aqueous, alcoholic, ethereal, and other solutions. Mixtures of two liquids are also readily analyzed by the use of the refractometer.

While determining the refractive index, another physical property, the dispersion, is obtained at the same time. Only one or two drops of liquid are required. So thin is the film of liquid employed that turbid and highly colored liquids, notwithstanding their absorption of light, can be investigated. Wherever the proportion of solvent to substance dissolved is often required to be known, a refractometer affords the quickest means of obtaining the information.

Measurements can be made using either daylight or artificial light, and the refractive index is read directly on the scale. Dispersions are obtained by reference to a printed table. The liquid to be investigated is enclosed as a film between two prisms of dense flint glass. The upper prism has a polished face in contact with the liquid, and it is the ray which grazes this face which is utilized in making measurements. Each prism is enclosed in a hollow jacket through which water at constant temperature can be circulated. The interior faces of the water jackets are gilded to prevent corrosion. The use of daylight is made possible by employing a compensator to neutralize the dispersion of the liquid and thus to give an achromatic field. The compensator consists of two direct vision prisms, which are rotated at equal rates in opposite directions by turning a milled head, and together form a system of variable dispersion. The compensator is provided with a scale, readings on which give dispersions by reference to printed tables provided with the instrument.

To make a measurement, a drop of the liquid to be investigated is introduced between the prisms. On looking through the eye-piece and moving the index, a dark shadow with a sharply defined edge comes into the field of view. This edge is brought onto the cross lines in the eye-piece and the corresponding refractive index read off on the divided scale. A test piece of glass, on which is engraved its refractive index, is supplied with the instrument, for the purpose of checking the setting, and simple means are provided for correcting the setting should it become necessary.

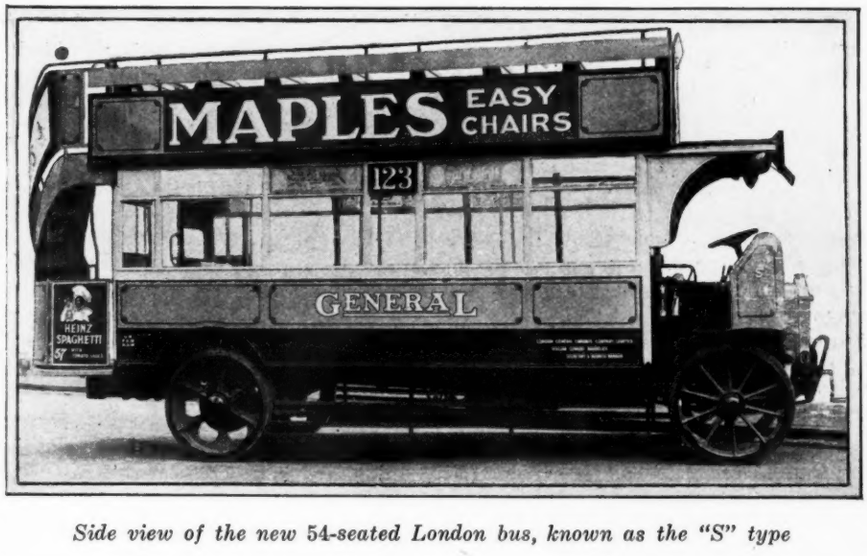
New British Bus Chassis Is Equipped With Body Seating 54 Passengers

New type will supersede model "K" heretofore described in these columns, and will accommodate 8 more passengers. Since the crew and the fuel consumed per mile are the same as that of earlier type the margin of profit is greater. Changes in construction include use of larger wheels and a single plate instead of multiple disk clutch. Half elliptic front and rear springs are supplemented with volute springs.

By M. W. Bourdon

PRACTICALLY the whole of the fleet of London buses now in use will eventually be superseded by a new model known as "S" type, which has a longer wheel-base, larger engine and a double-deck body seating 54 passengers. This new model has been running almost unnoticed on the London streets for the past few months, fifteen experimental chassis and bodies (with 57 seats in these first few examples) having been completed early last autumn. The first batch of production chassis is now in hand, and the last fifty of the preceding type are being finished off, making 1000 to be completed in all.

It will be recalled that in AUTOMOTIVE INDUSTRIES of Aug. 12 and 19, 1920, there were given particulars concerning the "K" type chassis and body which at that time represented the last word in London bus construction and had a seating capacity for 46 passengers, as compared with 34 of the pre-war "B" type bus. The latest increase in size and passenger accommodation has been made possible by a relaxation of the regulations laid down by the Metropolitan police, this variation being made at the instance of the new Ministry of Transport.



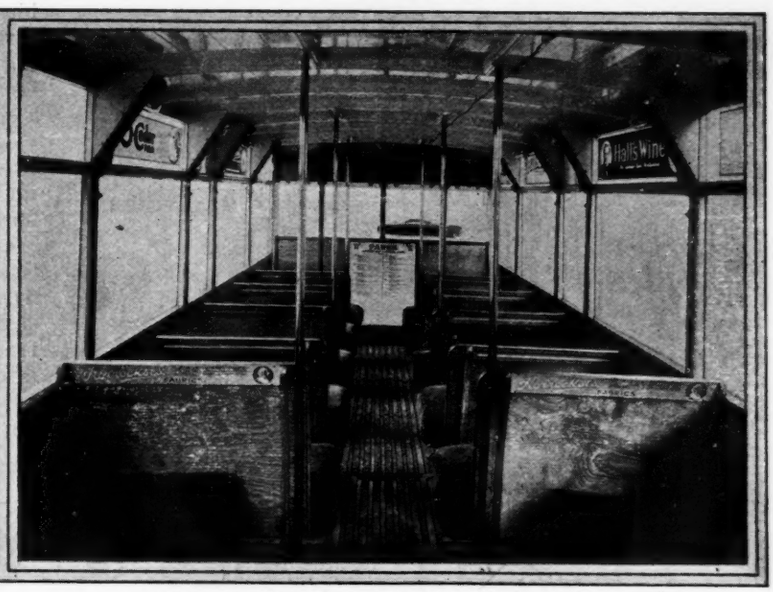
Side view of the new 54-seated London bus, known as the "S" type

The "K" type (1920 model) chassis represented an endeavor to fulfil the stringent requirements of the police authorities in regard to weight, simultaneously increasing the passenger capacity, but in endeavoring to comply with these requirements it was necessary to cut down chassis weight to an extent which, it must be admitted, rendered the chassis less reliable and durable than might otherwise have been the case. In the new "S" type the designers have been given more latitude, and in respect to both unladen and laden weights the old standards have been exceeded. Thus, not only has still greater accommodation been provided, but chassis details have been strengthened and, incidentally, the size of the road wheels has been increased.

A four-cylinder engine is used. It has a bore and stroke of 108 x 140 mm., approximately 4¼ x 5½ in. as against "K" type, 100 x 140 mm. The new S type engine develops 34 hp. at 1,000 r.p.m. The L head cylinders are in pairs on an aluminum crankcase, while the valves on the left are inclosed. The "K" type were not inclosed. The engine as a whole is suspended by means of four bolts from a pair of H section drop forgings resting on brackets secured to the side members of the flitch plate frame. In general construction the latter is unchanged, but, although the overall width of its members remains as before, the steel plates are now 3/16 in. thick as compared with 5/32 in.; they are also 2 in. deeper midway between the wheels and are slightly inset at the front to give the necessary steering lock. The top of the frame members is 3 in. higher off the ground, this being mainly due to the use of wheels of 1050 mm. (42 in.) diameter in place of those of 920 mm. (37 in.) diameter on the "K" type.

Reverting to the engine, this has hollow crankpins, a feature which is not, however, made use of to provide hollow-shaft lubrication, for the latter is on the circulating splash system with direct leads to the three crankshaft bearings. A separate lead is also taken to a point over the timing chain, which is rendered adjustable by mounting the magneto on a slotted bracket behind the timing case on the left side and this providing means to take up slack. In addition to the driving sprocket at the front end of the crankshaft there is a worm wheel engaging below it a worm gear on a trans-

Upper deck with seats for 28 outside passengers on the new "S" type London omnibus



View looking forward inside "S" type bus, showing seating arrangement in the 54-passenger body

verse shaft. This drives through a flexible coupling, the lighting dynamo which supplies current for interior and exterior illumination.

The grouping of the engine accessories and valves is entirely on the left side of the engine, so as to make these accessible upon raising that side of the hood, for, as in the "K" type bus, the driver's position is slightly above and alongside the engine on the right. Thus we find the exhaust manifold carried higher than the inlet branch on the left. The two are separate units and the inlet branch is completely water jacketed almost down to the carbureter flange. The carbureter is a Zenith without hot air supply, the jacketing of the branch being alone depended upon for vaporization of the fuel. Oil filler and oil level rod are also on the left. The magneto is entirely inclosed by a cast aluminum cover, which not only protects the magneto from water, but prevents the driver from tampering with it. The magneto has fixed timing; a throttle governor is not provided, but a slow running stop for the throttle pedal is fitted on the back face of the dashboard.

Oil is circulated by a pump driven by helical gearing from the camshaft, which is carried on three plain bearings and operates the slightly inclined valves through roller ended tappets of 1 1/16 in. diameter, drilled throughout practically the whole of their length to an internal diameter of ¾ in.

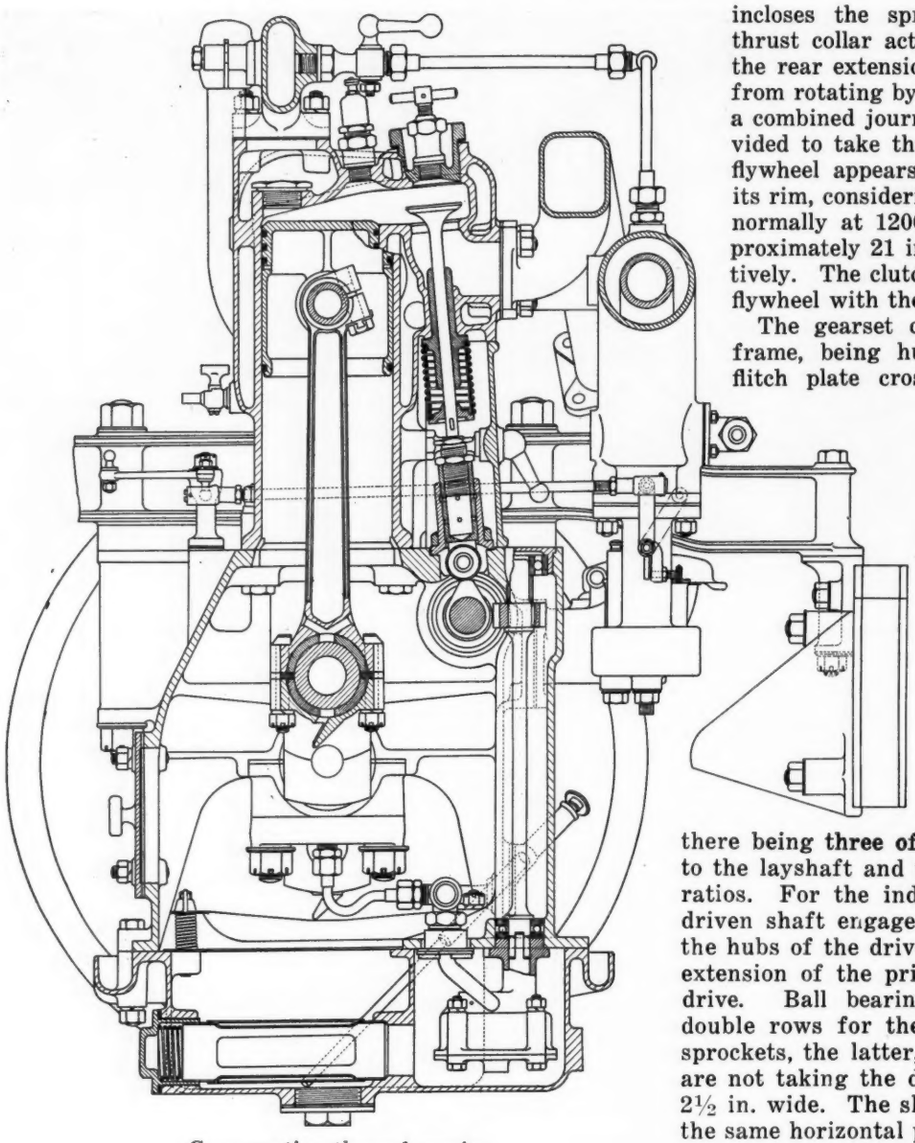
A point worthy of note is the position of the spark plugs in the cylinder heads; they are not screwed as usual into the castellated valve caps, but directly through the cylinder head toward the center of the bore, where they are in a better position for firing the charge and more intimately water-cooled. Four-bolt plain bearing big-ends are used on the 2⅛ in. diameter crank pins. Dippers are formed integrally with the big-end caps, but adjustment is provided for the troughs by holding each one, at its right hand extremity, down to a compression spring by a bolt. The H section connecting rods have 300 mm. centers, the upper end of each being split and provided with a pinch bolt to secure the hollow piston pin. The latter oscillates within unusually large bosses in the aluminum pistons, the dimensions of these bosses being such as to allow of their being bored out when worn after considerable use for the insertion of phosphor bronze bushes.

There is nothing remarkable in the design of the pistons, the axially split skirt with internal ring having been discarded in favor of a plain straight-side design. Three compression rings are fitted, with the land below the bottom one reduced in diameter so that this lower ring can form a scraper returning oil to the interior through small holes drilled radially. There is a second scraper ring in the skirt. No difficulty has been experienced with the use of aluminum for these heavy duty engines, and it is asserted that even with 0.003-in. clearance there is neither piston slap when cold nor a tendency to seize when the engine is hot—and it may be mentioned that these engines are more often than not running with the cooling water at approximately boiling point. In the latter connection it may be said that the V-shaped leather link belt driving the fan is kept under tension automatically by means of a loose front flange on the driven pulley, a volute spring keeping it constantly pressed toward the belt and the rear flange, an arrangement which has been found to be entirely satisfactory.

Water circulation is by a pump located on the front of the cylinder casting, its shaft being a continuation of that on which the driven fan pulley is mounted; thus the pump is belt driven. No underpan is fitted when the engine is assembled in the frame. Oil dripping is prevented by a trough which passes completely around the detachable aluminum sump, an arrangement which is also used in the case of the gearset.

In the "K" type chassis, which the "S" type supersedes, a multiple disk clutch is used, but in the new model a single plate pattern has been adopted. This has its central steel plate bolted to a flange on the clutch coupling shaft. At the friction surfaces the driven plate is reduced in thickness, the object being, of course, to reduce inertia as much as possible. Eight adjustable springs are used to clamp the driven plate between the fabric surfaces riveted to the rear cover and floating plate respectively. Four multiplying levers serve for disengagement purposes, but take no thrust from the spring when the clutch is engaged.

Lubrication of the clutch coupling shaft is accomplished by oil periodically fed by hand through a tube and cup, the latter being made readily accessible by passing through the pressed steel rear dust cover which



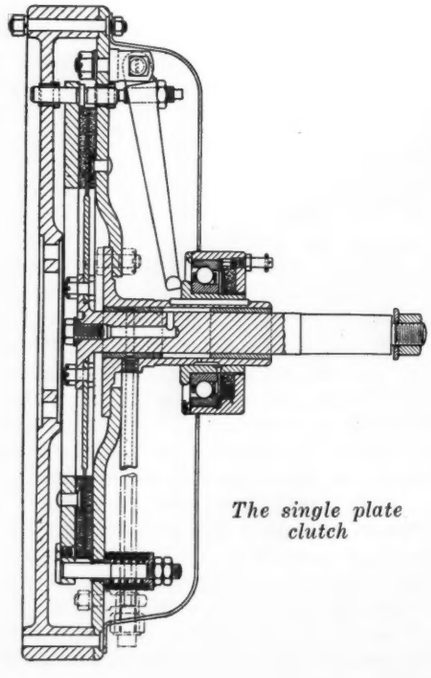
Cross section through engine

incloses the springs and multiplying levers. The thrust collar acted upon by the clutch fork floats on the rear extension of the back plate and is prevented from rotating by means of a link carried to the frame, a combined journal and thrust ball-bearing being provided to take the end thrust of disengagement. The flywheel appears to be unusually light in weight at its rim, considering that the engine is designed to run normally at 1200 r.p.m., but with a diameter of approximately 21 in., it seems to serve its purpose effectively. The clutch as a unit can be detached from the flywheel with the springs retained under compression.

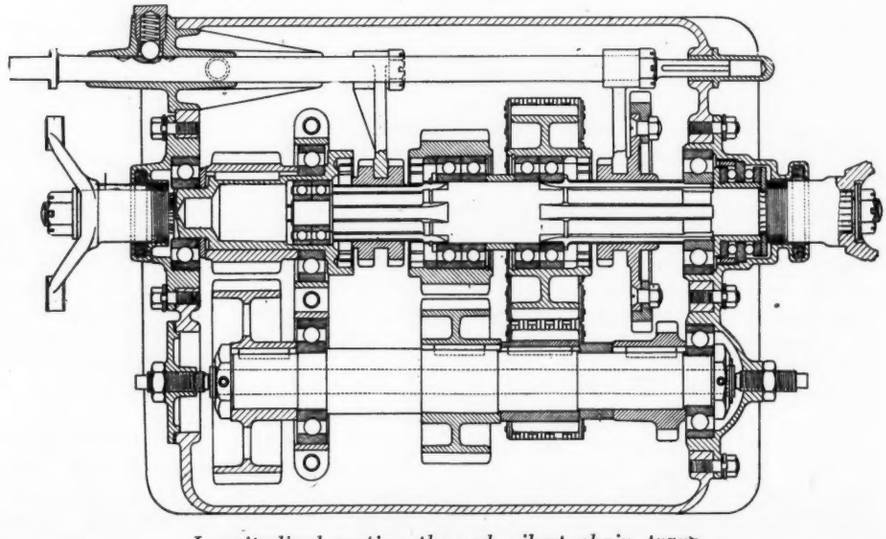
The gearset casing is separately mounted in the frame, being hung by three bolts from a pair of flitch plate cross members. Between it and the clutch is a coupling shaft at present fitted with flexible joints having steel disks, but these are to be displaced in the production chassis by fabric disks, trouble having been experienced through the steel plates cutting into and tending to shear off the bolts holding them to the star pieces.

Like the engine, the gearset is slightly inclined rearwardly so as to provide a straight-line transmission when the bus is loaded. There are three forward speeds with selector change. The indirect ratios, with the exception of the reverse, are obtained by silent type chains, there being three of these, one from the primary shaft to the layshaft and the others for the second and third ratios. For the indirect drives sliding sleeves on the driven shaft engage with internal teeth formed within the hubs of the driven sprockets and within a rearward extension of the primary chain sprocket for the direct drive. Ball bearings are used throughout, including double rows for the pilot bearing and for the driven sprockets, the latter, of course, rotating idly when they are not taking the drive. The chains in each case are 2½ in. wide. The shafts have 5¼-in. centers and lie in the same horizontal plane; the casing, of cast aluminum, has an oil level inspection and filling hole in the center of the overall lid.

From the rear end of the driven shaft the drive is taken by a ball-bearing star or cross-pin type of uni-



The single plate clutch



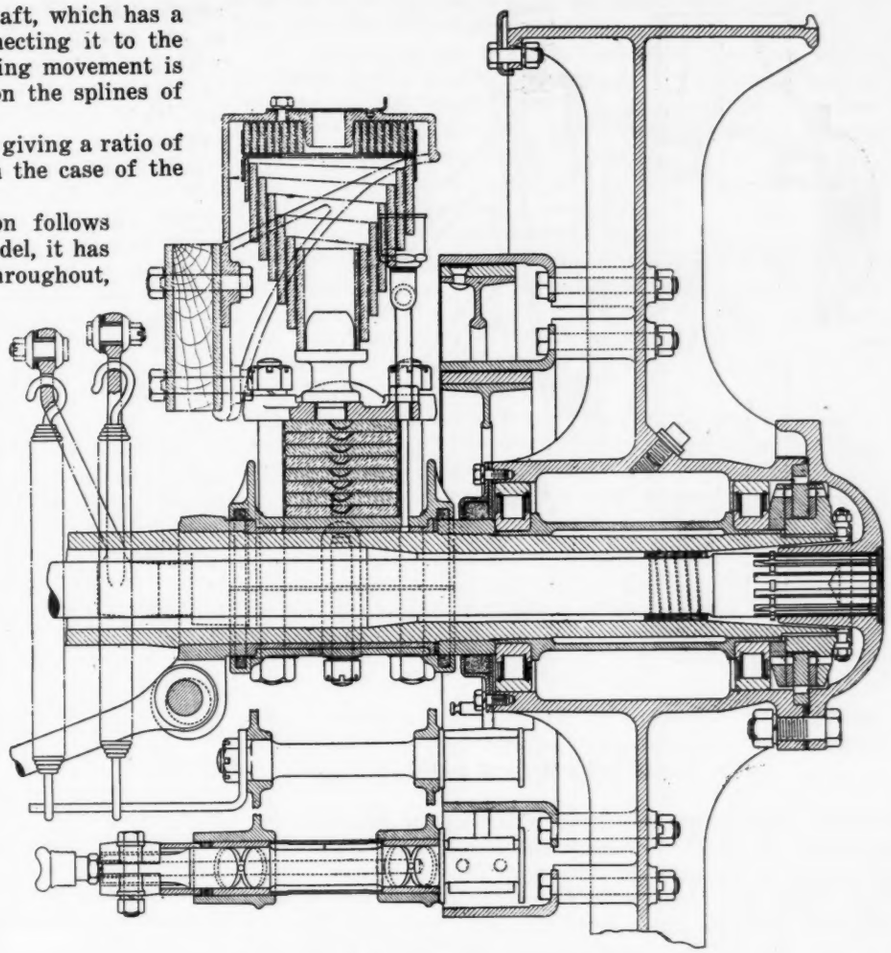
Longitudinal section through silent chain transmission

versal joint to the tubular propeller shaft, which has a similar type of joint at the rear connecting it to the worm shaft below the rear axle. Sliding movement is permitted at both ends of the shaft on the splines of the solid extensions.

A straight worm is used, the gearing giving a ratio of 9.3 to 1 as compared with 8.25 to 1 in the case of the "K" type chassis.

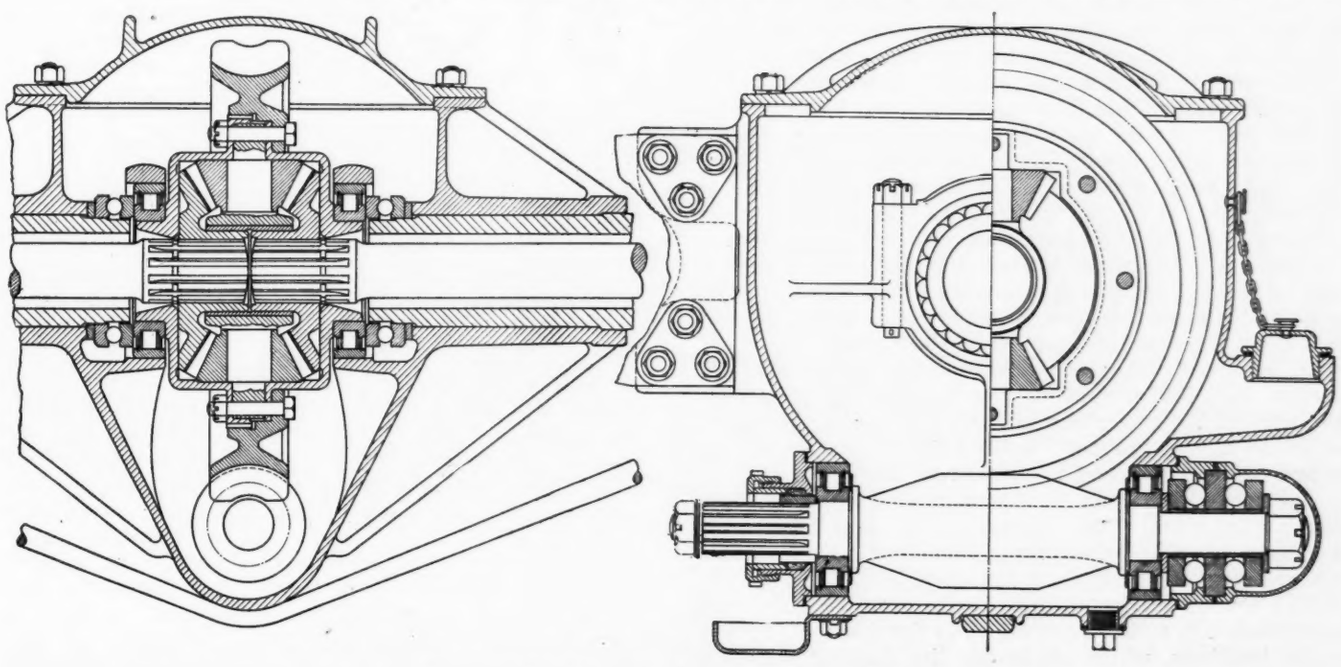
Although the rear axle construction follows generally the lines of the preceding model, it has been very considerably strengthened throughout, and, while the previous model had conical roller bearings for the differential casing and wheels, the "S" type has straight rollers with ball thrusts at each side of the differential and plain thrust washers for the hubs. The worm shaft also is mounted on straight roller bearings with ball thrusts. The axle center is a unit steel casting with webs on the horizontal and vertical center lines. It has its extension tubes pressed directly into the center, with a tie rod below mounted at each end on eccentric pins for maintaining the tension.

A special feature is the triangulated steel plate torque member, which is bolted to the front of the axle center; a forward extension is suspended between bronze blocks in which it can slide fore and aft or partially rotate, these blocks being supported above and below by rubber buffers in the supporting bracket. The plate is of spring steel, and the sliding motion permitted in its anchorage and the lateral "give" of the plate allow for axle movement due to equal or unequal spring deflection.

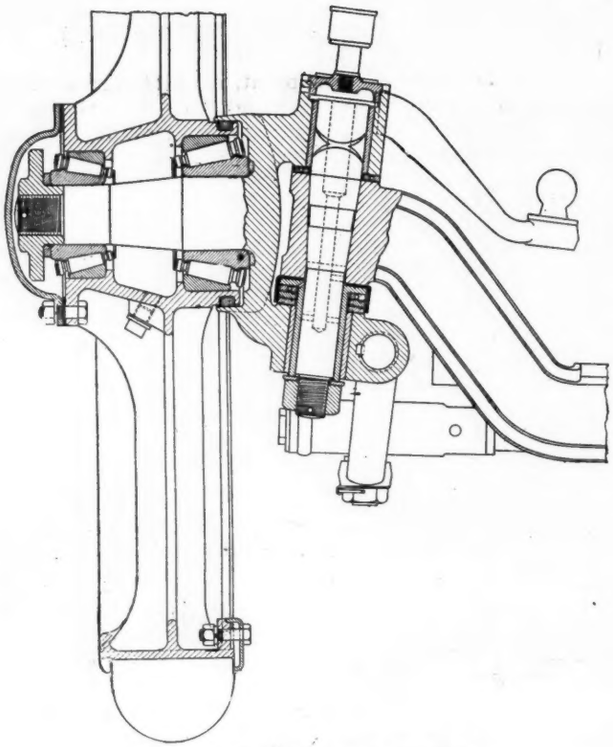


Rear axle end, spring and cast steel wheel

The rear axle casing has an overall cover plate, the removal of which allows the worm wheel and differential to be lifted clear after the driving shafts have been withdrawn. The latter have splined outer ends engaging with the hub caps which convey the drive to the wheel hubs, the latter, as already mentioned, being mounted on widely spaced (7-in. centers) straight roller bearings of which the rollers are ¾ in. in diameter. Both sets of



Rear axle center and undermounted worm drive



Front axle end and front wheel

brakes apply within concentric drums on the rear wheels, the latter being of the cast-steel web-spoked type with twin solid tires each of 120 mm. cross section. The brake shoes are faced with fabric, the outer sets being pedal applied; the inner drum has a diameter of 13½ in. and the outer 18 in., the width of the friction surfaces being 2⅞ and 2⅜ in. respectively.

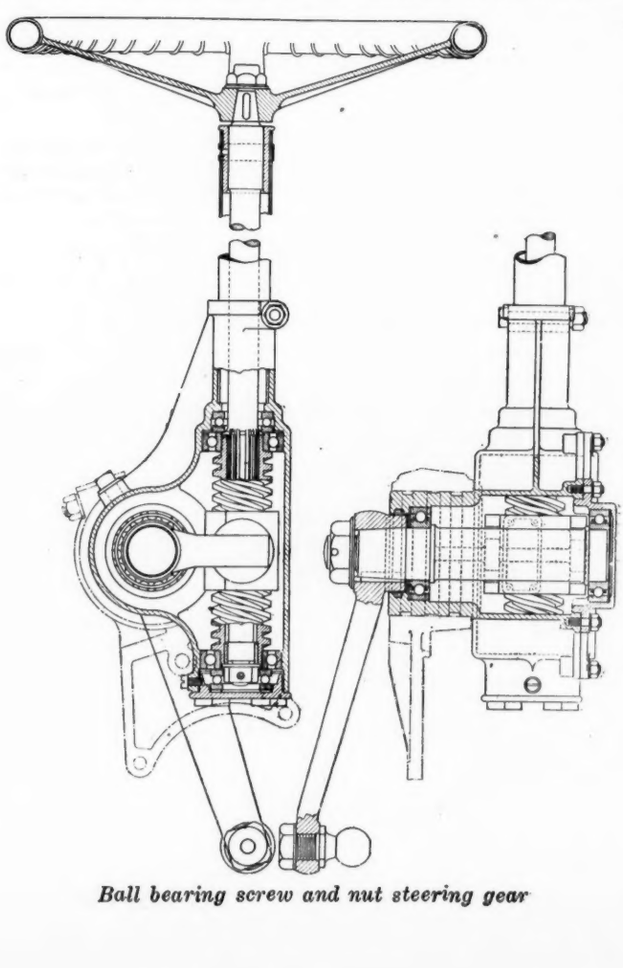
One of the most interesting features of the chassis is the spring suspension. Half-elliptic laminated springs are used fore and aft, but supplementing these to take an increasing proportion of the load as the bus fills up with passengers is a series of volute springs backed by brackets above them attached to the frame; the springs at their lower ends encircle studs or bosses projecting upward from the center clamping plates of the laminated springs. Each supplementary unit consists of two volute springs, but the first of these is merely a buffer spring for the second, serving to keep the latter always in firm contact with the axle so that it cannot lift away from the central stud. The main volute spring varies both as to section and width of the strip of which it is formed and it is in the "grading" of the spring in these respects that the main advantage of the arrangement is derived. Provision for introducing lubricant occasionally to prevent squeaking occurring due to the frictional contact between the coils is made by a swing lid surmounting the bracket attached to the frame.

In regard to the laminated springs themselves, the second main leaf is continued so as partially to encircle the eyes of the upper one at each end, while the center of each leaf is "pipped" to lock it in relation to the others and prevent end movement on the axle.

The front axle is an H section drop forging of 3 per cent nickel steel. Plain bushes and a plain thrust ring are used for the swivel pins, the latter being tapered where they pass through the ends of the main axle and drilled for lubrication of upper and lower bearings from the grease cup at the top end. The front wheels run on roller bearings, which supersede the floating phosphor bronze bushes of the "K" type chassis. Worm and nut steering gear is continued, with the lever shaft mounted on ball bearings. The wheel shaft is similarly supported with ball thrusts above and below the thread. In the "K" type chassis the steering link passed from the steering lever located on the right to the left-hand wheel swivel lever, the motion then being taken back to the right-hand wheel by the coupling rod; but in the production model "S" type chassis, this arrangement is being varied and the steering housing is supported at the front extremity of the frame immediately behind the radiator, with a short drag link running back over the axle to the right-hand swivel lever, this arrangement having been found to give easier and more precise steering control than the transverse drag link.

In regard to the bodywork, this follows very closely the arrangement and methods of construction adopted for the "K" type bus, described in detail with drawings in AUTOMOTIVE INDUSTRIES of Aug. 19 last year. The variations in the seating arrangement giving accommodation for 11 additional passengers in the fifteen experimental buses of the series consist of (1) a transverse seat for five passengers facing rearward immediately behind the driver within the interior, (2) two more two-passenger transverse seats added inside after reducing the longitudinal seating capacity from six to four, and (3) two more two-passenger seats outside. But the rearwardly facing seat has not been found completely satisfactory and the final decision is to eliminate it and return to the longitudinal seats, each accommodating 3 passengers. Thus, although the intention all along has been a 57-seated bus, 54 seats only will appear in the production model—eight more than in the "K" type bus.

The lengthening of the body has, of course, necessitated additional side pillars, but other variations are purely matters of detail. To relieve the body of the stresses due to overhang at the rear, the left-hand chas-



Ball bearing screw and nut steering gear

sis frame member is extended beyond the right-hand unit; the former therefore supports the loading platform and staircase, enabling the superstructure to be appreciably reduced in weight at this point.

The running of the fifteen experimental buses during the past six months or so has not merely been for the purpose of testing out the chassis, but also to ascertain various points of doubt in connection with the running of such comparatively large units; for instance, whether it is a paying proposition to run a larger type, whether the conductor could collect all the fares, etc.

Actually, it has been found that the margin for profit is greater with the larger unit, and for some reason, which is as yet obscure, the fuel consumption of the 57 seater has proved to be almost exactly the same as the 46-seated bus, approximately 5.8 mi. per gal. Obviously, with the wages of driver and conductor the same, this result cannot be viewed as other than extremely satisfactory.

As is probably known, the vast majority of London buses are operated by the London General Omnibus Company, which is one of the units of the combine having control also of the Underground Railways, but the chassis manufacturing concern is the Associated Equipment Company, which has a modern plant at Walthamstow, London, E., where, when in full swing manufacturing bus and truck chassis, some 3000 hands are employed. The output at the present time of bus chassis alone has been worked up to 50 per week. The Resident Director in charge of the plant is H. Kerr Thomas, who for some ten years prior to 1920 held a similar position with the Pierce-Arrow company.

All units—engine, gearset, back axle, steering, etc.—are made in the Walthamstow plant, for although until a year or so ago engines were bought outside, the conclusion was then reached that it was preferable to produce all components under the one roof.

The Associated Equipment Company are also makers of chassis for provincial buses and 3 to 4-ton trucks, which vary in certain details from the bus chassis; for example, they have pressed steel frames and 4-speed spur pinion gear-boxes. Why the London Omnibus Company still continues the flitch plate frames is not made clear, and their preference is the more peculiar because the cost of these is admittedly 50 per cent more than that of the pressed steel variety.

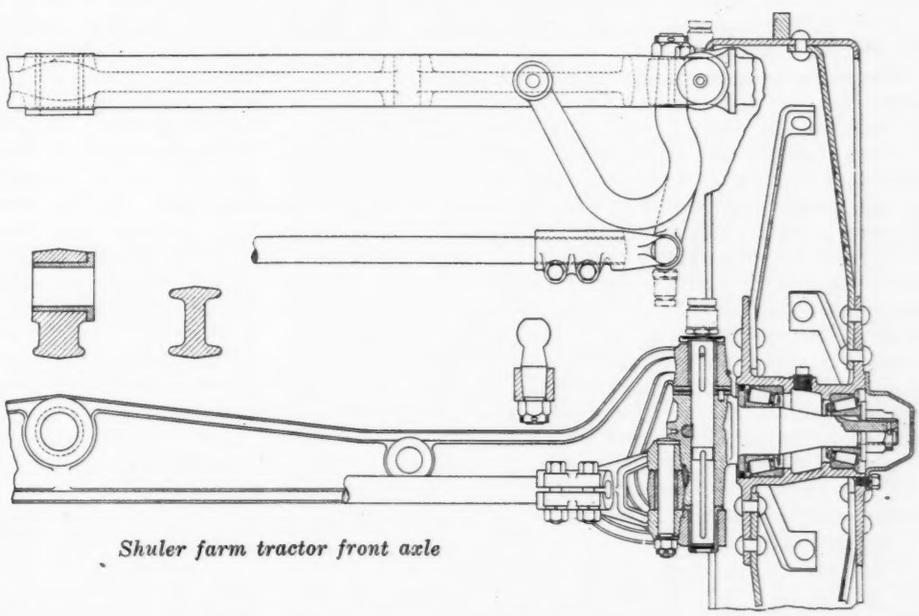
The following comparative dimensions and weights of the three types of London buses referred to in the foregoing will be of interest.

	"B" Type*	"K" Type†	"S" Type†
Seats	34	46	‡57
Overall length	22 ft. 6½ in.	22 ft. 4½ in.	24 ft. 7 in.
Overall width	6 ft. 10 in.	7 ft. 1 in.	7 ft. 1 in.
Wheelbase	12 ft. 10⅝ in.	14 ft. 2¼ in.	14 ft. 11 in.
Track	5 ft. 8 in.	5 ft. 10 in.	5 ft. 10 in.
Rear overhang	7 ft. 7⅜ in.	6 ft. 8 in.	7 ft. 2¾ in.
Body length	11 ft. 9¼ in.	13 ft. 10¾ in.	16 ft. 1 in.
Weight of chassis	5,590 lb.	5,150 lb.	6,500 lb.
Weight of bus (unladen)	9,000 lb.	8,400 lb.	9,800 lb.
Weight of bus (laden, 54 passengers, driver and conductor, gasoline and water)	14,240 lb.	14,850 lb.	18,000 lb.

*Driver behind engine. †Driver alongside engine. ‡To be 54 in the standardized body.

Front Axles for Tractors

TWO sizes of front axles for farm tractors have been put on the market, one for 2-3 plow tractors and the other for 3-4 plow. The former has a load capacity limit of 2000 lb. and the latter of 3000 lb., the whole weight at the forward end, including axle and wheels, being considered.



Shuler farm tractor front axle

In order to permit vertical oscillation of the axle it is pivoted under the frame at the center. The axle center is of the customary I-beam section, made from a 0.30-0.40 carbon one-piece drop forging, heat treated, and is tapered from the yoke to the pivot boss in the center. The central pivot boss is provided with a hardened and ground steel bushing with a flange on the aft side to take the thrust. The axle is pushed almost entirely through radius rods secured to it at points near each yoke and converging to an axial point some distance behind the pivot boss. The I-beam is thickened appreciably at the points where the radius rods are fastened in order to resist any stresses induced at those points. The balance of the axle is very similar to standard motor truck axle construction with the exception that the camber is taken out of the spindles.

The axle center at the steering heads is bushed with hardened and ground steel and the king pin is of nickel steel carbonized, hardened and ground, the whole construction at this point being inclosed. The thrust is taken on two hardened and ground steel washers of large area. The steering knuckles and steering arms are low nickel chrome steel drop forgings, heat treated, the steering arms being bushed with steel. The cross rod is of cold-rolled steel. The rod ends are drop forgings, tied to the arms with a hardened and ground pin. The steering arm ball is of 3½ per cent nickel steel, hardened and ground, and may be located on either side of the axle with either the fore and aft or cross type of steer. The tie rod, however, is always placed behind the axle. The wheel spindles are equipped with Timken roller bearings.

The Shuler Axle Mfg. Co., who build these axles, supply wheels of their own design also if desired, these being either a fabricated type of wheel or an integral cast wheel of malleable iron.

A Device for Automatic Control of Airplanes

Is designed to relieve the pilot from fatigue in long flights. Pendulum, usually employed in devices of this character, is replaced by a mercury column which, by means of electric contacts controlling air valves, operates ailerons and elevator. Control equipment weighs about 150 lbs.

IT is quite obvious that controlling an airplane continuously for long periods of time places a heavy strain on the pilot, especially in a gusty atmosphere, and many attempts have been made in the past to render airplanes self-righting or provide them with automatic stabilizers. Most of these have been based upon the pendulum principle, but these encounter the difficulty that in describing a curve the pendulum is subject to centrifugal force and tends to assume an inclined rather than a vertical position.

A French aircraft engineer, Georges Aveline, has invented a rather ingenious device in which the effect of centrifugal force is compensated for, and this has recently been fitted to a Handley-Page passenger airplane in England and tried out with apparent success. In piloting a machine so fitted, the pilot does not have to bother with the aileron and elevator controls, except in getting off and in landing, and has only to control the rudder to maintain the desired course.

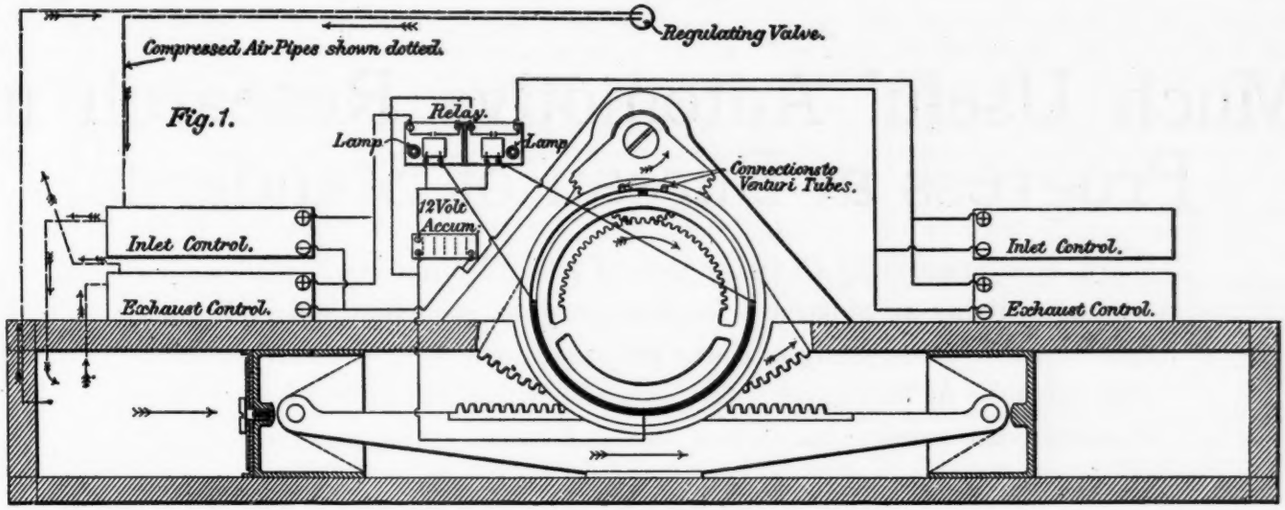
The mechanism employed for controlling the ailerons, shown in Fig. 1, is mounted transversely in the cockpit. It comprises a disk of red fibre in which is formed a circular channel that is half filled with mercury. There are three electric contact terminals in the channel, one at the lowest part and one just above the level of the mercury in each branch. If the machine tilts to one side the mercury on that side of the circular groove will come up to the electric contact and the electric circuit will be completed from the bottom contact through the mercury. Each of the two circuits which can thus be completed contains a relay, and these relays each control a 12-volt circuit including electro-magnets which in turn control the inlet and exhaust valves of a compressed air servo motor. A section of this servo motor is shown in Fig. 1, and it will be seen to be of the single cylinder, double piston type. The two pistons are connected by a toothed rack which meshes with a quadrant to which the aileron control wires are connected.

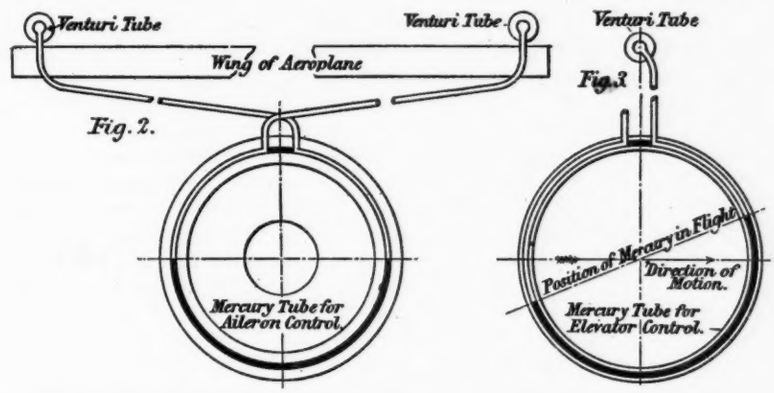
When air is admitted to one side of the servo motor and the exhaust valve at the other end is opened, the pistons move, turn the quadrant, and so operate the ailerons to correct the tilt. The disc containing the mercury channel is also geared to the quadrant, so that it turns in the opposite direction and, by this means, the contact is broken and the pistons are brought to rest after moving through an angle corresponding to the amount of tilt. By means of a valve fitted in the exhaust pipes the rate of movement can be regulated as desired.

It is obvious that this is a gravity mechanism like a pendulum and that centrifugal force has an influence on the level of the mercury. To overcome this Mr. Aveline has provided suitable means which form one of the most ingenious features of his device. To turn the machine the pilot moves the rudder bar with his foot, and the machine immediately commences to swing around in a more or less horizontal plane—say to the right. The resulting centrifugal force causes the mercury to rise in the left-hand arm of the mercury channel, making contact on that side, and the effect of this is to pull down the outer aileron and raise the inner aileron, thus causing the machine to bank in the correct manner. The fibre disc, of course, moves in the opposite direction to the quadrant and would break the electrical connection and leave the ailerons in the positions above described but for the special means referred to.

As soon as the correct banking is reached, it is necessary to replace the ailerons into the neutral position, otherwise the banking would become excessive and the machine would probably side slip. To avoid this the arrangement illustrated diagrammatically in Fig. 2 is employed. A Venturi tube is mounted on each tip of the upper wing of the machine and the throats of the tubes are cross-connected to the arms of the mercury tubes as indicated in the diagram. Obviously, the suction from the Venturi tube on the outer wing tip will be greater than that from the other tube, since the former is moving faster than the latter, and the effect of this will be to raise the mercury in the inner arm and make an electrical contact on that side. By this means the ailerons are returned to the mid position, and the machine continues to travel on a properly banked turn until the rudder bar is again moved by the pilot, when the reverse action takes place, bringing the machine back on to a horizontal straight-line path.

The apparatus for controlling the elevator is generally similar in principle to that used in connection with the ailerons, the main distinction being that the plane of the mercury channel is in a fore and aft direction and that one arm of the mercury tube is connected to a Venturi tube in the centre of the machine, while the other arm is open to the atmosphere. The arrangement of this part of the apparatus is indicated by Fig. 3. In normal flight the position of the mercury would be as shown in the illustration, the forward arm being at a higher level than the after arm, owing to the suction of the Venturi tube. The pilot has to adjust the fibre disc so that the electrical contacts are just above the level of the surfaces of the mercury in the arms and any alteration in the speed, or fore and aft inclination of the machine will then complete the circuit to a relay and servo-motor similar to that already described, thus effecting the necessary adjustment of the elevator. It is equally possible for the pilot to set the disc for any desired angle of climb and the machine will then continue to climb at this angle until the disc is readjusted for horizontal flight. In the event of engine failure while the fore and aft automatic control is in use, the drop in speed and the consequent diminution in the suction from the Venturi tube will allow the mercury to fall in the right-hand arm of Fig. 3 and rise in





Aveline automatic control apparatus for airplanes

the left-hand arm. In this way the servo-motor will be operated to put the machine into a downward glide without any action on the part of the pilot, who would only have to steer the machine to a possible landing ground and flatten it out just before alighting.

If it is desired to control the machine in the ordinary way, either or both of the servo-motors can be instantly put out of action by the pilot, without leaving his seat, by means of valves fitted in the compressed-air pipes or by slackening the cables connecting the quadrants with the main control cables. If the former method of disconnection is adopted, the apparatus can still be employed as an inclinometer to indicate a tilt in either the longitudinal or lateral directions. This is due to the fact that small incandescent lamps are included in the circuits connecting the mercury channels with the relays. The lamps are fitted in the front of the relay casings, which are mounted on the instrument board in the cockpit in full view of the pilot. When the machine is flying level laterally, or at the correct longitudinal inclination, all the lamps are extinguished, but a slight tilt in either direction, by disturbing the level of the mercury, will cause one or other of the lamps to light up and indicate the existence of the tilt to the pilot.

The compressed air required to operate the servo-motors is provided by two small wind-driven rotary pumps mounted on the bottom longerons on both sides of the fuselage. These pumps maintain a pressure of about 60 lb. per square inch in a cylindrical reservoir placed inside the fuselage. The reservoir also serves as a receptacle for oil for the rotary pumps, these, of course, requiring constant lubrication. A maximum pull of 500 lb. can be produced in the cable attached to the quadrant, this pull being ample for the control of the largest machines at present in use.

The apparatus complete, as fitted to the Handley-Page passenger-carrying machine, weighs 150 lb. This, of course, is considerable, as it reduces the carrying capacity by one person, but it is argued that on long trips the fitting of this automatic stabilizer permits of dispensing with a reserve pilot which would otherwise be needed. It is, moreover, hoped to reduced the weight to 100 lb. by refinements in design. A company to exploit the invention has been formed in England. The drawings herewith are reproduced from *Engineering*.

THAT a rush for oil leases in the Brazeau Forest reserve, west of Edmonton, Alberta, is being experienced is indicated by the payment of nearly $25,000 in fees to the Aines Branch of the Edmonton office within the first two weeks of December. Land Office officials estimate that nearly 95,000 acres have been filed upon, half of which, under the new regulation, is reserved to the right of the Crown. Chief among the interests which have filed on this property are the Imperial Oil Company and the Oliphant Manson Collieries. It is stated that the Imperial Oil Company will set aside $2,000,000 for development in the Alberta oilfields this year, and that, if results warrant, the appropriation will be increased.

A PROCESS for reducing tungstic acid into tungsten powder and molybdenum sulphide into metallic molybdenum has been worked out by a Norwegian firm. It claims that the final products, which are in the form of small tablets, are of the most superior quality, being completely free from sulphur, carbon, or oxygen. It also says that the price for converting the ores into metal is lower than by any other method known by it. It is at present projecting a plant for the reduction of tungstic acid in Norway.

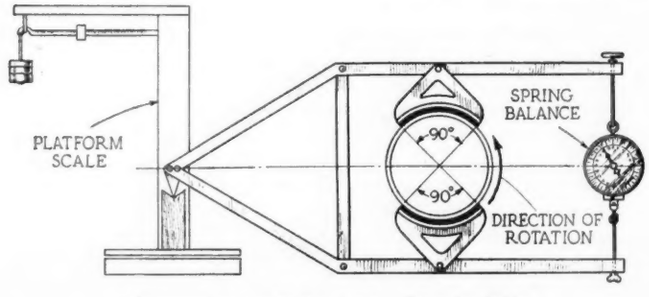
Much Useful Automotive Research in Progress at Bureau of Standards

Work now proceeding includes tests of brake linings made with a view to standardizing an apparatus for this purpose, efficiency and endurance tests of truck axles, study of flame propagation and detonation phenomena, and tests of lubricants intended to determine definitely what physical characteristics render an oil best suited for use in automotive engines.

By Herbert Chase

AUTOMOTIVE organizations which have been sufficiently interested in the research work being undertaken at the Bureau of Standards to urge upon Congress adequate support of this work, should find in the results being attained ample justification for their efforts, even though Congress has not yet voted the funds necessary to continue much of the work now in progress. Quite a large proportion of the latter is being done for other departments or bureaus, but the results are certain to be of general value in most cases.

One line of work which will be of immediate value to automotive manufacturers is that being undertaken for the purpose of standardizing tests and test apparatus calculated to determine the relative merit of various brake-lining materials. This work is being done in co-operation with the Motor Transport Division of the Quartermaster Corps and the S. A. E. Standards Committee. The apparatus used is illustrated in the accompanying cut. It consists of a 2½ x 14-in. brake drum such as is used on Dodge cars, arranged to be driven by any convenient means, such as an ordinary automobile engine. Bearing on the drum are two external shoes to which the samples of lining to be tested are riveted in the conventional way. The shoes are carried by a linkage (as shown in the cut) one end of which forms a brake arm resting on platform scales used to measure the torque applied by tightening the hand wheel, at the other end of the linkage. A spring balance placed between the upper and lower members serves to measure the total pressure exerted on the two brake shoes. It will be seen that the apparatus is simply a prony brake, by means of which the power input to the brake facing is readily measured. The facings are each cut of such length as to cover one quadrant of the drum. Tests have been made at selected constant speeds from 200 to 1000 r.p.m. and with a standard input varying from 4 to 15 hp., the given power being maintained by applying to the brake shoes the necessary pressure by turning the hand wheel.



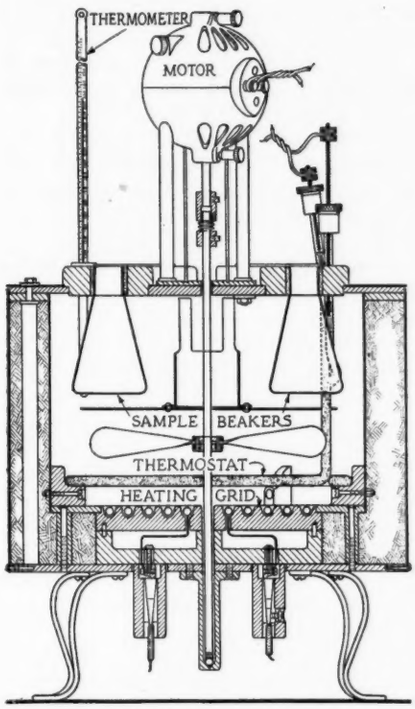
Apparatus used for tests of brake lining

The linings are run until worn away to one-half their original thickness, the power absorbed and the time required for wear being measured. These tests are being tried with various power inputs and various speeds in order to determine the speed and power which will enable a fair comparison to be made of wearing quality without requiring an undue amount of time for the test. When a sufficient number of tests have been made on the various makes of lining it is proposed to establish a standard test, the application of which will make it possible for users of brake lining to intelligently specify the properties that an acceptable lining must have. At present so many kinds of tests are employed that the lining manufacturers find it impossible to predict in advance what performance can be expected of their product. Some tests have been made, for example, in which the lining was simply allowed to run against a pulley traveling at a given speed, while a weight tied on the end of the lining was used to pull it taut. In this test account was taken only of the time before the sample wore in two, without regard to the power absorbed, with the result that the sample which had a certain amount of material, such as paraffin, which acts as a lubricant impregnated within it showed the best performance, whereas other samples were better suited to perform the function for which brake lining is intended. It should be noted that the apparatus described enables determination of the coefficient of friction as well as of the wearing qualities of the lining.

Axle Tests

Tests for the purpose of determining the efficiency and durability of various types of final drive in truck rear axles are proceeding and should also furnish much data of value to manufacturers and designers. The axles under test include for the present only those types intended for use on army trucks, but the apparatus being used is applicable to test of any axle. The axles undergoing test include the White double reduction type, and the worm gear type used on Class B army trucks, the latter being fitted in various tests with Timken roller bearings, ball thrust bearings, or deep-groove ball bearings, in order to determine which of the three bearing types is best suited for the service in question.

The layout of apparatus is as follows: Power is supplied by an electric dynamometer, running as a motor, on current supplied from an external source. To the



Standardized apparatus for Waters carbonization test

field frame of the dynamometer is rigidly connected a four-speed gearbox such as is used in the Class B truck, the outer end of the transmission being supported in a ball bearing trunnion similar to that used on the field frame of the dynamometer. The driven shaft of the gearbox is attached to the dynamometer shaft, and the driving shaft of the gearbox to the driven shaft of the axle to be tested. The purpose of the gearset is to enable direct drive, or drive through either of three sets of gears with reductions of 1.76, 3.23 or 5.93 to 1, as desired. In every case the torque delivered at the final driving shaft of the transmission is the torque measured on the dynamometer arm, the losses in the transmission being automatically deducted by the expedient of carrying the gearbox on the field frame of the dynamometer. This enables accurate measurement of the power input to the rear axle to be tested, and a wide range of torque output.

In order to enable measurement and absorption of the power output from the axle, the differential is locked and two large prony brakes are applied to the rims of the driving wheels carried by the axle, the rubber tires having been removed and the rims machined to afford a smooth surface for the bands of the prony brakes to bear upon. Each brake carries two bands, one bearing upon each of the dual rim bases. Chattering of the brake, which at first gave some trouble, is prevented by lubrication with graphite grease. Load is applied by tightening nuts on eyebolts attached to each of the bands. The wheel drums are kept cool by evaporation of water fed to their inner surface.

Each prony brake is provided with a long arm extending the entire length of the testing apparatus to a point near that end of the dynamometer shaft furthest from the transmission. The combined torque of the two arms is transferred to and weighed by a system of linkage with counterpoise arranged adjacent to the scale used for measuring the torque output of the dynamometer. By properly proportioning the length of the various arms and weighing the difference in torque it is possible to determine directly and accurately the efficiency of the axle under test. The method employed is identical in principle with that used by Prof. Allen of Worcester Polytechnic Institute.* Efficiency tests are being made with power input varying from 5 to 55 hp. The speed of the electric dynamometer is maintained constant at 1200 r.p.m., this corresponding to the governed speed of the Class B truck engine.

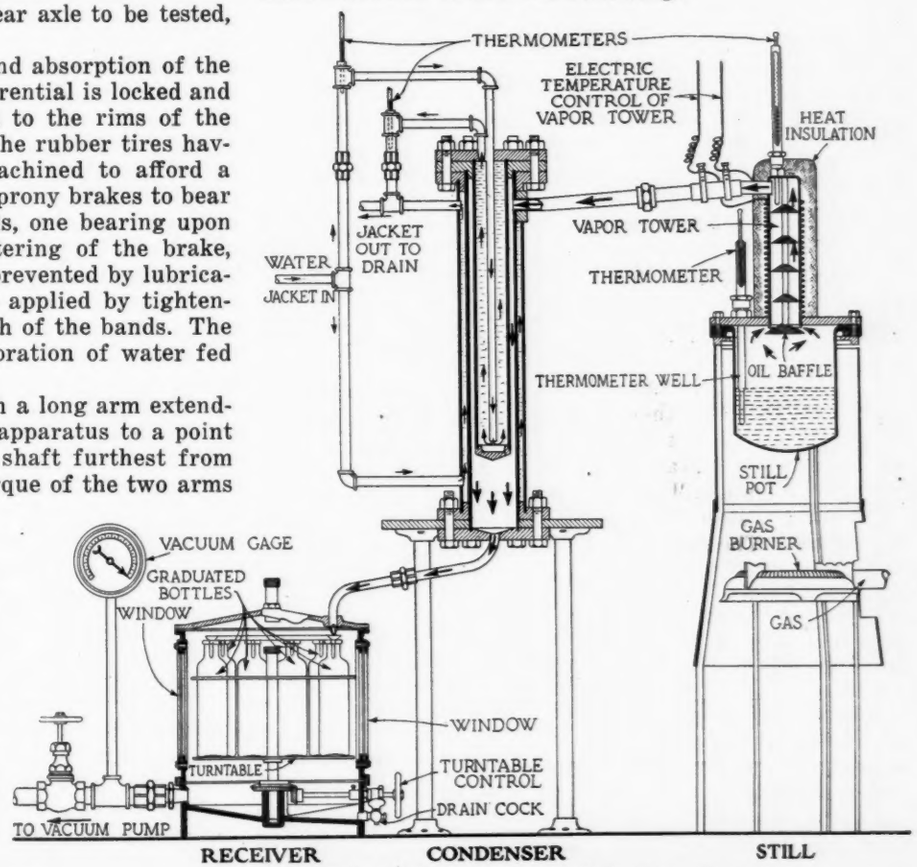
By use of the transmission gears, a wide range of torque is obtained in the same manner that it is obtained in truck operation. The lubricant used in the rear axle is 600 W cylinder stock. The temperature of the lubricant is maintained constant in various tests at 80 deg., 116 deg. and 212 deg. Fahr. respectively by a spray of water on the outside of the axle housing, the temperature being measured at the thrust bearing and in the sump below the worm gear.

Following the efficiency test it is planned to make an endurance test in which the transmission will be set in low gear and the dynamometer adjusted to deliver 55 hp. continuously until breakage of some axle part occurs, thus similating the most severe condition possible in actual service with the Class B truck.

Tests of Lubricants

Tests of lubricants which have been proceeding for many months have been much handicapped by lack of sufficient personnel, but these tests are going forward as rapidly as possible under the conditions prevailing. The program of lubricant tests includes tests of trade oils, standardization of Waters carbonization test, physical properties of lubricating oil when diluted with engine fuel, investigation of tests for greases, investigation of bearing friction, fractionation of finished hydro-carbon lubricants to find original constituents of blended oil, effects of temperature on oil film adhering to a hot plate, engine tests of hydro-carbon oils and absorption of gasoline vapors in hydro-carbon oils.

Among the items which it has proved possible to give most attention to are the following:



Vacuum still for fractionation of lubricating oils

*See AUTOMOTIVE INDUSTRIES for June 13, 1918.

The apparatus developed for the purpose of standardizing the Waters carbonization test is shown in the accompanying cut. It consists of a double compartment cylindrical air bath, the walls of which are made of sheet iron with heat insulating material between them. This apparatus was built around a hot plate having a low heat capacity in order that changes in the temperature of the heating element will be quickly felt in the air bath. Directly above the heating coil is located the bulb of an adjustable mercury thermostat of special design, which serves to keep the temperature of the bath at 250 deg. C. and constant to within ½ deg. C.

The thermostat is not designed to carry the total heating current, but a commercial type relay is interposed in the circuit to interrupt the current passing to the heating element. A closer degree of regulation can be obtained by connecting a variable resistance in series with the heating coil, and allowing the relay to short circuit this resistance upon closing.

The cover of the bath consists of a circular sheet of hard asbestos board and is bored to hold six glass flasks and thermometer. The flasks are held in place by split collars so arranged that no leakage of air around either the flask or the collar can occur.

The air in the bath is stirred by a two-bladed fan, driven by a motor vertically and centrally mounted on the asbestos cover and connected thereto by a shaft and flexible spring coupling. The lower bearing of the shaft is an ordinary single ball thrust type. The air in the bath driven by the fan is forced to circulate around the flasks by baffling, and is returned to the center of the chamber through a cylindrical spider which also serves as a mount for the baffle plate.

In making a determination of the carbonization value, 5 g. samples of the oil to be tested are weighed to the nearest drop in the flasks. The bath is heated to 250 deg. C. and the flasks containing 5 g. samples inserted. The temperature of the bath is then kept constant to within ½ deg. C. for a period of 2½ hours. The technic of operation thereafter is practically the same as described by Dr. C. E. Waters in Bureau of Standards Circular No. 99.

Fractionation of Finished Hydrocarbon Lubricants

In order to find the original constituents of blended oil and determine other qualities by means of distillation, it has been necessary to develop an apparatus for low pressure distillation, since complete distillation, if attempted at atmospheric pressure would require temperature sufficiently high to decompose or crack the lubricant.

This apparatus is similar to that employed in research work conducted for the Tidewater Oil Co. and others by C. W. Stratford, but has been improved in detail. Referring to the diagram:

The vacuum distillation apparatus in use at the Bureau consists of a steel still having a 2½ liter capacity and a still head. The still head is connected with a vertical water jacketed condenser which in turn leads to a receiver holding ten graduated bottles, each having a capacity of 200 c.c. These bottles are arranged on a turntable brought into position without alteration of the pressure in the distillation system. The whole system is connected with a pump capable of maintaining a vacuum of 1.5 mm. absolute pressure. For recording the pressure, a manometer is placed between the pump and the receiver. The temperature of the oil in the still, the vapor temperature and also the temperature of the condenser water are measured by standardized thermometers. Violent boiling or bumping occurs in distillation under reduced pressure. At times this bumping becomes so violent that unless special precautions are taken to prevent it, oil is carried over into the condenser, thus contaminating the distillate. This can be overcome by using conical screens attached to a steel rod suspended in the still head and a steel baffle plate attached to the bottom of the still head.

The still is charged with 2000 c.c. of the oil under examination. Great care is taken to have all connections and joints air tight to prevent oxidation of the oil, due to leakage. The pump is then started and when the manometer indicates the desired pressure, heat is applied. A ring type gas burner is used which is set low so that no fire touches the still bottom, thus preventing localized heating and consequent coking or cracking. When the first drop of distillate comes over, the temperature is read and recorded as the initial boiling point. Thereafter the temperature is recorded for every ten per cent of distillate, and when 200 c.c. of distillate have been collected a new bottle is brought into place. The rate of distillation is easily controlled. The time for a complete distillation varies with different types of oils, the usual time being from 2 to 2½ hours.

The fractionation of finished lubricating oils under vacuum is a satisfactory method for determining the boiling point limits with the least decomposition of the product, provided, however, that the distillation is not carried on after a temperature of 300 deg. C. has been reached in the still. Experiments have been made in which it was attempted to distill oils above 300 deg. C., but it was found that above this temperature cracking occurred; more extensively in some cases than in others. When cracking takes place, the heavier hydrocarbon molecules break up and are altered so that low boiling hydrocarbons are formed. Temperatures above 300 deg. C. are favorable to this reaction.

There are several means of determining whether or not cracking occurs during distillation. When cracking takes place the distillation continues for some time with little or no increase in temperature. Specific gravity, flash point and viscosity measurements would indicate cracking if the suspected fraction showed marked variations with regard to these properties. Cracked distillates have a disagreeable burnt odor.

Gasoline engine tests are being run at the Bureau of Standards to compare the lubricating qualities of paraffin and naphthene base motor oils. These tests are being run with a view to answering the following questions:

1. How long can an oil be used in service?
2. At what rate does lubricating efficiency decrease?
3. What are the causes of decrease in lubricating efficiency?

In connection with these engine tests, the vacuum distillation test will enable a selection to be made of a series of oils from both paraffin and naphthene bases having a known boiling point range. The vacuum distillation test also determines the loss of volatile constituents of motor oils during use in an engine by comparing the volatility of the oil before and after use. The difference in volume of the distillates up to 300 deg. C. is taken as a measure of the loss due to evaporation of the light constituents of the oil during exposure to the high temperatures of the engine. This test also serves to indicate the relative consumption to be expected with various oils.

The distillation of finished lubricating oils under vacuum as described meets all the requirements of a successful routine method for the examination of lubricating oils determining of what groups of hydrocarbons, highly volatile or less volatile, they consist, and permits separation of these portions into graduated fractions. It also shows the quantity and quality of the component light, intermediate and heavy oils used in blending.

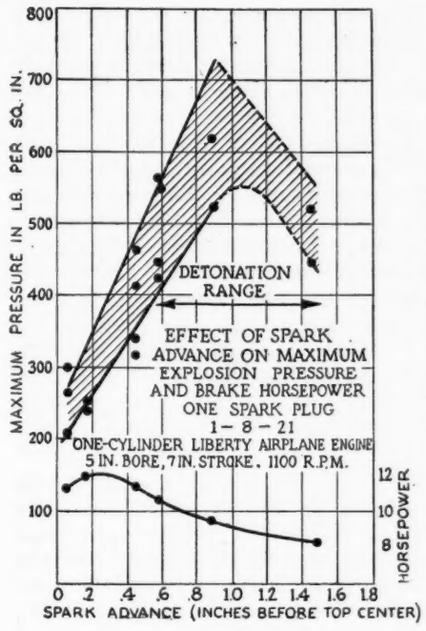


Fig. 1

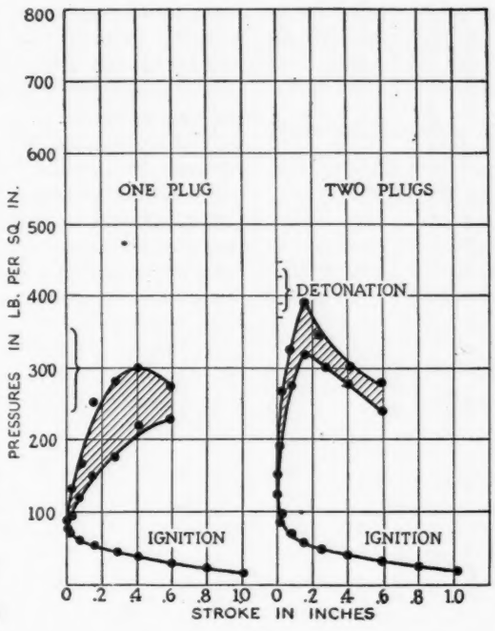


Fig. 2

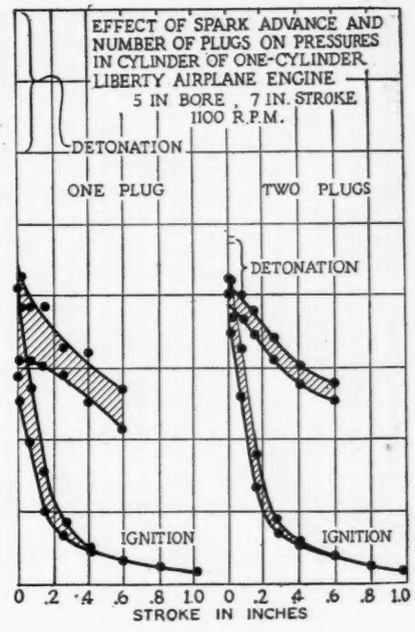

EFFECT OF SPARK ADVANCE AND NUMBER OF PLUGS ON PRESSURES IN CYLINDER OF ONE-CYLINDER LIBERTY AIRPLANE ENGINE
5 IN BORE, 7 IN. STROKE
1100 R.P.M.
DETONATION
ONE PLUG
TWO PLUGS
DETONATION
IGNITION
IGNITION
0 .2 .4 .6 .8 1.0 0 .2 .4 .6 .8 1.0
STROKE IN INCHES

Fig. 3

Curves showing effect of spark advance and number of sparks on maximum pressure, detonation and power output of a single-cylinder Liberty engine

This method is one of the most valuable means of identifying the source of crude from which lubricating oils are derived, as there is a marked difference in the boiling points and the yields of distillate obtained between paraffin and naphthene base oils.

Engine Tests of Hydrocarbon Lubricants

It is the purpose of the Bureau to test numerous different oils on the market before and after use for considerable period in automotive engines. In order to do this engines are run under constant test conditions and change in the character of the lubricant noted by collecting representative samples at various stated intervals during the test. The lack of personnel has prevented completion of many tests of this character, but some work in this direction has been done.

It has been found that the fit of pistons and rings plays a very large part in determining the oil consumption of a given engine. In order to prove this, pistons and rings, with various qualities of fit, have been tried in an engine arranged to measure the oil in the exhaust from the engine when driven by an electric dynamometer. In this way some of the relations between ring fit, piston fit and speed have been determined, but the results obtained to date are too far from complete to draw any general conclusions. In some cases very low oil consumption has been obtained by pinning the rings in order to prevent them turning to such a position as to bring the ring slots into approximately the same plane. When they turn to this position the oil consumption is much higher than when they are pinned to prevent this occurrence.

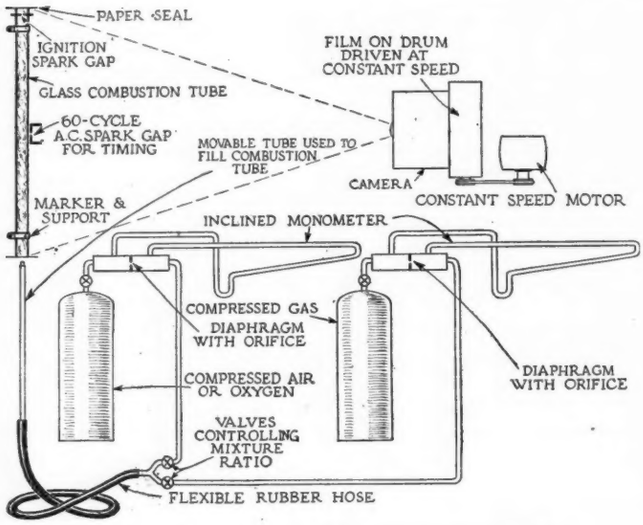
In addition to the tests of lubricants above mentioned, the Bureau is, of course, equipped to make the ordinary flash fire, viscosity, gravity and cold tests, as well as the Waters carbonization tests, the Conradson carbon residue tests and the Herschel demulsibility test to determine rate of separation from water.

Tests of Fuel

Tests of fuel with respect to their utilization in automotive engines are not proceeding rapidly, owing to the lack of appropriation for such tests, but many interesting results have been obtained in spite of this fact. It has been found, for example, in studying the effect of detonation that, with an engine having a 5 to 1 compression ratio, maximum pressures in excess of 1300 lb. per sq. in. are developed when using kerosene for fuel and pressures in excess of 1200 lb. per sq. in. with commercial gasoline. These pressures do not occur with regularity, but are the result of occasional detonations much more violent than others.

Other tests have proven definitely that spark advance is at least to some extent a controlling factor with respect to the occurrence of detonation. The effect of spark advance on maximum pressure is shown clearly in the attached curves. Fig. 1 is plotted from the results of tests on a single cylinder Liberty engine of 5-in. bore and 7-in. stroke. The effect on horsepower output is also to be noted. It will be seen that the maximum power is developed when a spark advance of approximately ¼-in. piston travel is used. An advance beyond this point causes detonation and a falling off in power, but the maximum pressures are not reached until a spark advance of 1 in. is used. Beyond this point the maximum pressure decreases though detonation continues. The range of pressure recorded is marked by the upper and lower curve.

It has sometimes been said that an engine which will knock badly with a single spark will cease knocking when two sparks are applied by plugs in different parts of the cylinder. This is true within certain limits, but from tests made at the Bureau it becomes evident that the determining factor in this respect is in reality what may be termed the effective spark advance. Suppose, for example, that in the case of the engine referred to detonation occurs with a single spark at a point 0.6 in. before center. (Fig. 1.) Using two sparks at this point will in effect advance the spark and cause more violent detonation. If, however, the engine is knocking badly with an advance of 1.4 in. on a single spark, and 2 sparks are applied, knocking will cease, due again to the earlier effective advance. Hence it is clear that the effective advance is the controlling factor and not the mere occurrence of one or two sparks.



Apparatus used in study of flame propagation phenomena

This is further illustrated in Figs. 2 and 3. Under the conditions obtaining in Fig. 2, it will be noted that with one spark detonation does not occur, the range of maximum pressure, from cycle to cycle, varying as shown by the bracket from about 240 to 350 lb. per sq. in., while with two sparks, and the same actual advance, maximum pressures due to detonation, as shown by the bracket, run from about 370 to 450 lb. per sq. in. On the other hand when the spark advance is increased and ignition occurs nearly 1 in. of piston travel before center (see Fig. 3), violent detonations resulting in occasional maximum pressures (as shown again by the bracket) of 600 to 800 lb. occur, whereas, when two sparks fired simultaneously occur at the same advance, the maximum pressures are much less, although detonation is not entirely absent.

Other tests made with varying ratios of air to gas indicate that the detonation is also dependent upon the proportion of fuel in the mixture, under a given spark advance.

With a constant velocity of cooling water through the jacket of a cylinder it has been noticed that a very rapid rise in temperature takes place when detonation occurs, this indicating that considerably more heat is lost to the jacket under this condition.

A quartz window in the cylinder reveals the fact that detonations are accompanied by extremely brilliant flashes of light. It is thought quite probable that carbon particles cracked out of the fuel during the process of combustion are heated to incandescence by the sudden liberation of energy which accompanies the detonation. It seems likely that the radiant heat liberated under these circumstances accounts, in part at least, for the rise in temperature of the jacket walls. It has generally been supposed that the amount of energy released during detonation is small, although the rise in pressure is extremely rapid. The foregoing phenomena indicate, however, that detonations are accompanied by very considerable energy liberation, but that this energy produces only a small equivalent in work, the bulk of it going to increase jacket losses.

It appears that there is still a considerable difference of opinion regarding the cause of detonation and the resultant knock or ping. Some still think that the knock is due to the impact upon the combustion chamber walls of gas molecules in the rapidly moving wave front. In this case it would be expected that the maximum pressure would occur on the combustion chamber wall opposite to that in which the spark plug is located. Tests made at the Bureau indicate, however, that the maximum pressures generated are the same in different parts of the cylinder.

Others attribute detonation to the following phenomena: a charge compressed in the cylinder is fired, say at one point. The combustion of the gas through which the flame travels during the earlier stages of burning results in a rapid rise of pressure and consequently of temperature in the remaining unburnt gas, until finally a temperature high enough to cause auto-ignition throughout the entire mass is attained, this resulting in very sudden release of energy and corresponding temperature and pressure rise. Whether or not either of these theories will stand or one or both of them prove to be incorrect remains to be seen.

Study of Flame Propagation

One of the interesting activities in progress at the Bureau is that in which a study of flame propagation is being made. Two methods are being followed in the prosecution of this work. One of these involves the use of a photographic means for determining the rate of propagation in a glass tube which can be readily filled with a mixture of the desired richness. The proportion of air to combustible gas is determined by allowing streams of each to flow through calibrated orifices. The two are then mixed and introduced into the tube. The mixture can be pre-heated if desired. After the tube is filled with the mixture the ends are sealed by a soap film or very light tissue to prevent diffusion of mixture into the air of the room. The mixture is then ignited by a spark at one end of the tube. The tube is located near one end of a darkened room, and at the other end of the room a camera is set up. The film is mounted on a drum driven at constant speed by a small electric motor. The film is allowed to turn continuously with the shutter opened during the time that the room remains dark. When the gas is ignited and the flame travels through the tube the photograph is taken on the film, the moment of passing of the ignition spark being clearly visible. Alternating current is passed through a second spark gap placed near the tube. The sparks resulting from alternations at known frequency show on the film and enable accurate measurement of the time interval for passage of the flame between markers placed a known distance apart on the tube. To date only fixed gases have been used in these experiments, but tests with vapors of gasoline and other hydrocarbons are to be conducted later.

It appears that it is possible to accurately duplicate, with tubes of given diameter, tests made in this manner, but that the results vary considerably with change in diameter of the tube. For this and other reasons another method of measuring the rate of flame propagation is being employed. This consists of photographic means for measuring the angle of the flame contour in a jet of combustible mixture issuing from a tube at known speed. Knowing the mixture speed and the angle it is possible to determine accurately the rate of propagation.

The process of combustion is evidently gravely affected by temperature and pressure of the explosive gases as well as by their composition and mixture ratio. The presence of inert gases and the size and shape of the container have also their effect. The difficulty has been to determine with certainty the individual effect of these factors; for, in the engine cylinder they are massed together and are constantly changing. The same gaseous mixture, for instance, under one condition, may give an

apparent rate of flame propagation of ten meters per second. Under another set of conditions, it may show a rate of sixty meters per second; or, it may detonate and travel at a rate of 2400 meters per second. The conditioning factors seem to be chiefly those of pressure and temperature. The methods of study of these phenomena have been carried out, for the most part, in spherical bombs and the results analyzed from imperfect pressure records. The movement of the flame in glass tubes has also been observed and accurately measured; in both of these cases, however, there is a mass movement of the charge masking the true flame velocity. In the case of the tubes, a profound cooling effect is present, and the pressures and consequently temperatures are not continuously determinable with the changing rate.

The direction of the investigation of this subject at the Bureau of Standards has therefore been to seek the effect of these factors on the rate of combustion. The flame angle method referred to has been chosen for following these reactions at constant pressure. It seems to meet all the ideals of this condition as completely as the spherical bomb does those of constant volume. It has the further advantage of being wholly visible and of allowing the apparent flame velocity to be corrected for the mass movement of the charge, together with a high accuracy of temperature determination. There is also being developed a method of determining the effect of temperature (preheating) upon the rate of combustion at constant pressure, and for varying pressure at constant initial temperature. For adiabatic conditions, velocities and pressures are simultaneously recorded.

Tests, the purpose of which was to measure the impact effect of gas molecules traveling at high velocity in a flame front, have been made in the following manner: A metal tube of known weight about 30 in. long is suspended in a horizontal position from the ceiling by two fine wires, thus forming a ballistic pendulum. The tube is filled with the combustible mixture and lightly sealed with a soap film at the open end. A spark, igniting the mixture near the open end, causes the flame to travel toward the closed end and react thereon. This causes the tube to swing backward as a result of the gas impact. The energy of the impact can then be determined by carefully noting the distance the tube moves.

Tests of Aviation Engines

Exhaustive tests of a 180 hp. Hispano-Suiza aviation engine are being made for the National Advisory Committee for Aeronautics for the purpose of determining accurately the effect of varying compression pressures and mixture ratios upon power output at atmospheric pressures corresponding to different altitudes from ground level to 25,000 ft., in steps of 5000 to 10,000 ft. The speeds used are 1,400, 1,600 and 1,800 r.p.m. At each altitude five different mixture ratios are employed, the spark adjustment in each case being that necessary to give maximum power. Tests are also made at ½, ¾ and full load. Friction hp. is also determined and the actual compression pressure at 1,600 r.p.m. on all cylinders is measured. When completed this test, which is conducted in the laboratory especially designed for the purpose, will be the most complete of its kind ever conducted. It should prove of great value to designers of aviation and other types of automotive engines.

Tests of Ignition Apparatus

Work is now proceeding for the purpose of determining mathematical expressions for the electrical characteristics involved in the design of magnetos.

Certain tests recently made on spark plugs indicate that the voltage necessary to break down a spark gap is lower when the electrodes are hot than when they are cold, this condition being independent of the temperature of the gas between the electrodes.

Much other work along automotive lines is in progress, but most of this is being done for various branches of the service and it is not permissible at the present time to describe the work or outline the results being obtained. Ultimately, however, it is expected that these particulars will be made available for publication.

A Drop Forged Steel Wheel

A NEW type of wheel has made its appearance on the market—the drop forged steel wheel. As compared with wood wheels, the forged steel wheel has the advantage that it consists of only a single piece and therefore has no joints to come apart. Being made of wrought steel, it is practically unbreakable. Even the brake drum is made in one piece with the wheel and where it fits to the spokes the joints are nicely rounded so as to prevent the accumulation of mud and dust at these points. All trouble due to the shrinkage of wood is eliminated, and if the wheel is made true in the first place it should remain true.

It is always difficult to make a comparison of the weights of wheels of different kinds, as the comparison should be made between wheels of exactly equal strength, and as the strength of wheels in different planes is not always proportional, this is difficult to do. It is stated by the manufacturer that the wheel in question is practically as light as the standard wood wheel and of much greater strength. The wheels are said to be easy to clean. Soft mud will stick to the concave side of the spoke, but when it has dried it will be thrown off by centrifugal force, it is claimed.

The drop forged steel wheel should prove particularly popular in arid sections where wood wheels give trouble, owing to shrinkage. The wheel is designed to carry the standard demountable rim and it is not necessary to carry a spare wheel on the car. It is manufactured by The Jefferson Forge Products Co. and at present seems to be made chiefly for replacement on several makes of small, popular-priced cars.

The Jefferson drop forged steel wheel

Utilization of Special Machines in Cylinder Block Production

One of the distinguishing factors of the cylinder block production described in this article is the use of specially simple jigs, while an effective location system permits positive alignment of all faces and finish surfaces. The various machining operations are discussed in detail.

By J. Edward Schipper

THE manufacture of the Paige cylinder blocks is distinguished by the use of very simple jigs and by an extremely simple system of location which permits positive alignment of all faces and finish surfaces, and renders unnecessary complicated means of determining location.

The cylinder block is for the Paige little six, which is manufactured in the Paige Motor Car Co. plant. Normal production on this model runs 100 per day, and the shop is tuned up on a 9 hr. basis, which gives a production through the machinery of nine pieces per hour. The operations are so arranged and the machinery has been selected in such a way that no particular machine runs ahead of the rest of the shop. Thus all piling up of parts is avoided and the floor kept absolutely free from accumulation of parts around any one machine. This idea is carried further than in most plants, as instead of cylinder blocks entering a finished stock department, or at least accumulating beyond requirement, they are passed immediately to the engine assembly line. In other words, there is no definite hiatus between manufacture and assembly on these blocks. The floor is so laid out that the final manufacturing operation on different parts takes place adjacent to the point at which they are required for the assembly line.

The raw castings for this cylinder block average 240 lb. apiece, and the finished casting 200 lb. Thus, about 40 lb. of metal are cut from each block during the various processes of manufacture, or 4000 lb. of metal per day in the cylinder block machining department. As the operations are followed through this article, it will be noticed that no deep cuts are taken at any particular point along the line. The rough casting is very closely approximate to the finished casting in its exterior and machining dimensions.

The cylinder block is checked over in a rough inspection jig before any operations are performed. This jig has stops between the No. 3 and 4 cylinders and the top and bottom. The amount of metal required endwise is checked by the stop between the third and fourth cylinder, and the depth of these castings is checked by the top and bottom stops, which indicates that there is sufficient metal for all of the machining operations made.

The first machining operation is located in exactly the same manner as the casting check on the rough inspection jig. In other words, the stops on the jig for the first operation are duplicates of the stops on the rough inspection jig. The machine is an Ingersoll reciprocating miller which mills the valve side of the casting. This machine has three cutters and is capable of handling nine blocks per hour. All faces on the valve side are finish milled in this operation.

The second machining operation is on an Ingersoll of the long table type, capable of carrying five blocks at a time. There are double rows of cutters in this machine, giving first, a rough, and second, a finish cut on the three faces of the block not milled by the first machine. Location for this work is from the top and bottom flanges. This machine leaves the block with all four sides finish milled.

After the milling operation, the next operation is to drill two dowel holes from which every subsequent machining operation is located. In drilling these dowel holes on a Cincinnati-Bickford radial, the block is located from the milled faces and from a V-block between the third and fourth cylinders. Besides the dowel holes, which are ½ in. in diameter, the main feed holes for the oil line and the oil pump holes are drilled and reamed on this machine.

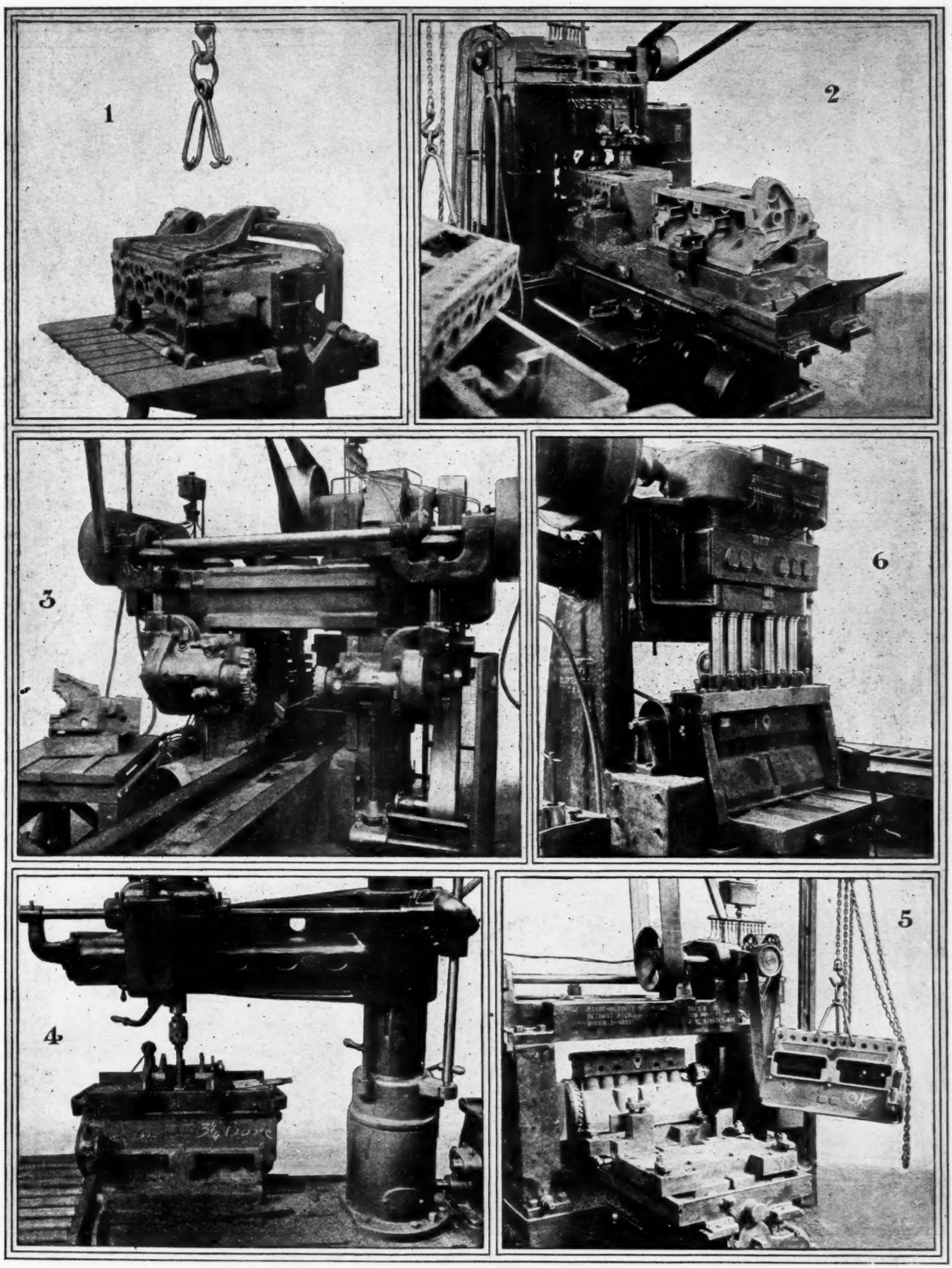
A special Ingersoll miller with a traveling cutter takes care of the next operation, which is milling both ends of the block. On one end, the cutter is designed to rise and fall. It is timed so that as the table feeds, the cutter travels over the surfaced portions of the rear face in what is, roughly speaking, a three-sided figure. The cutter rises, milling one face, then remains stationary while the table travels, milling the top face, and then descends, milling the third face. The table for this machine takes two cylinder blocks at a time and the machine makes the finish cut. Location is from the dowel pin holes.

Three Foote-Burt cylinder boring machines give the cylinders a rough, semi-finish and finish bore respectively. After the final bore, 0.020 in. is left in for reaming. On the finish bore, the limit is 0.0005 in. Location for this operation is from the dowel pins only. The cylinders are then left in their finish bored condition to go through the remaining operations, the final surface being put on the cylinder walls later, as will be described subsequently.

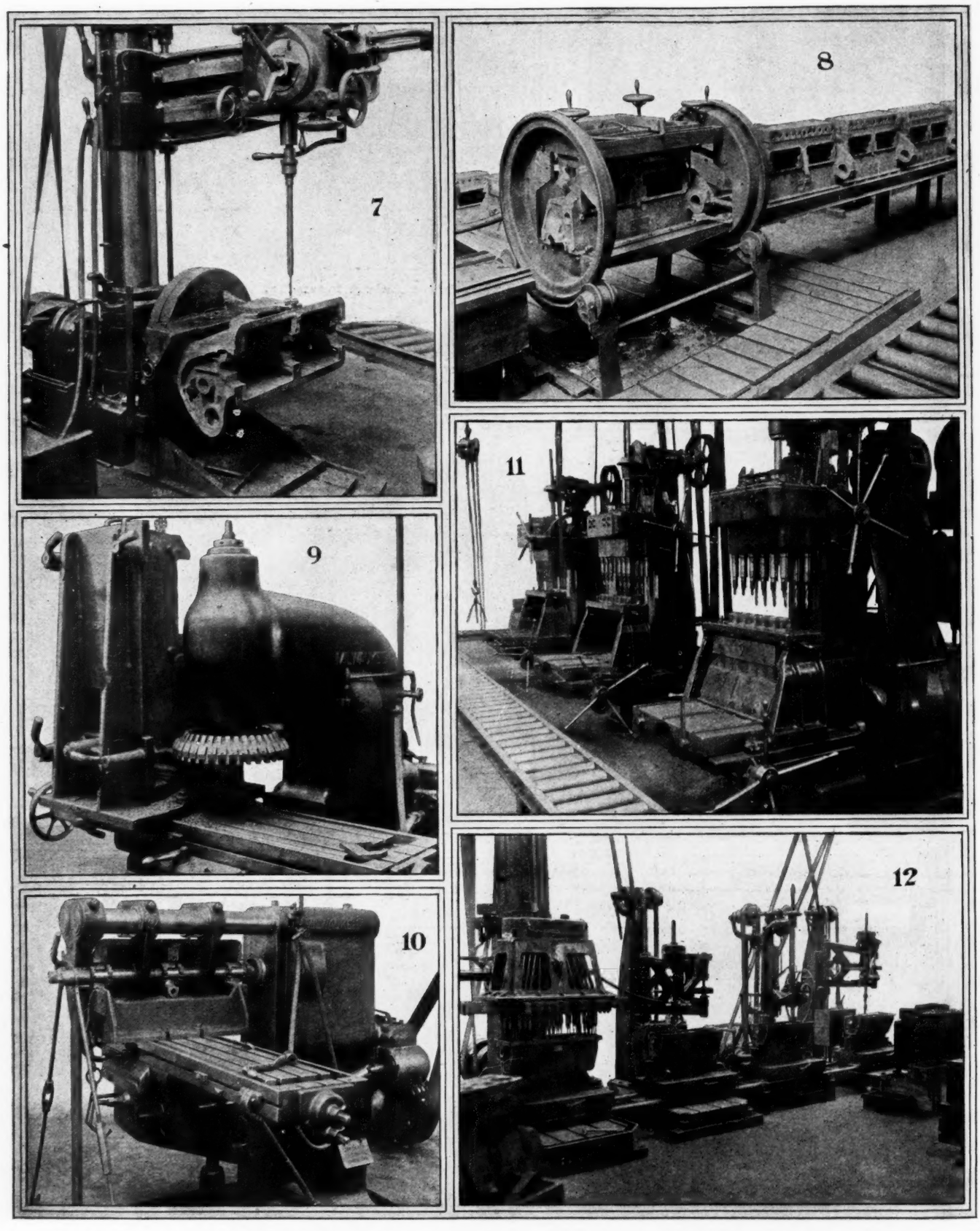
Two American radial drills take care of the next operation, which is drilling the fan stud holes and the Hubbard plug holes, as well as the cylinder drain holes. In this same operation, the intake passage in the top of the cylinder is drilled out and also the stud holes for the carbureter.

As an economy measure, a preliminary water test is given the cylinder block at this point. This is done on a jig which seals all of the water holes and allows the application of a 60-lb. hydraulic pressure. Only relatively few operations have been taken up to this point and leaks can be detected at a time when it is not expensive to salvage the block. This is only a preliminary water test, of course, as a later test is necessary after other cuts have been made.

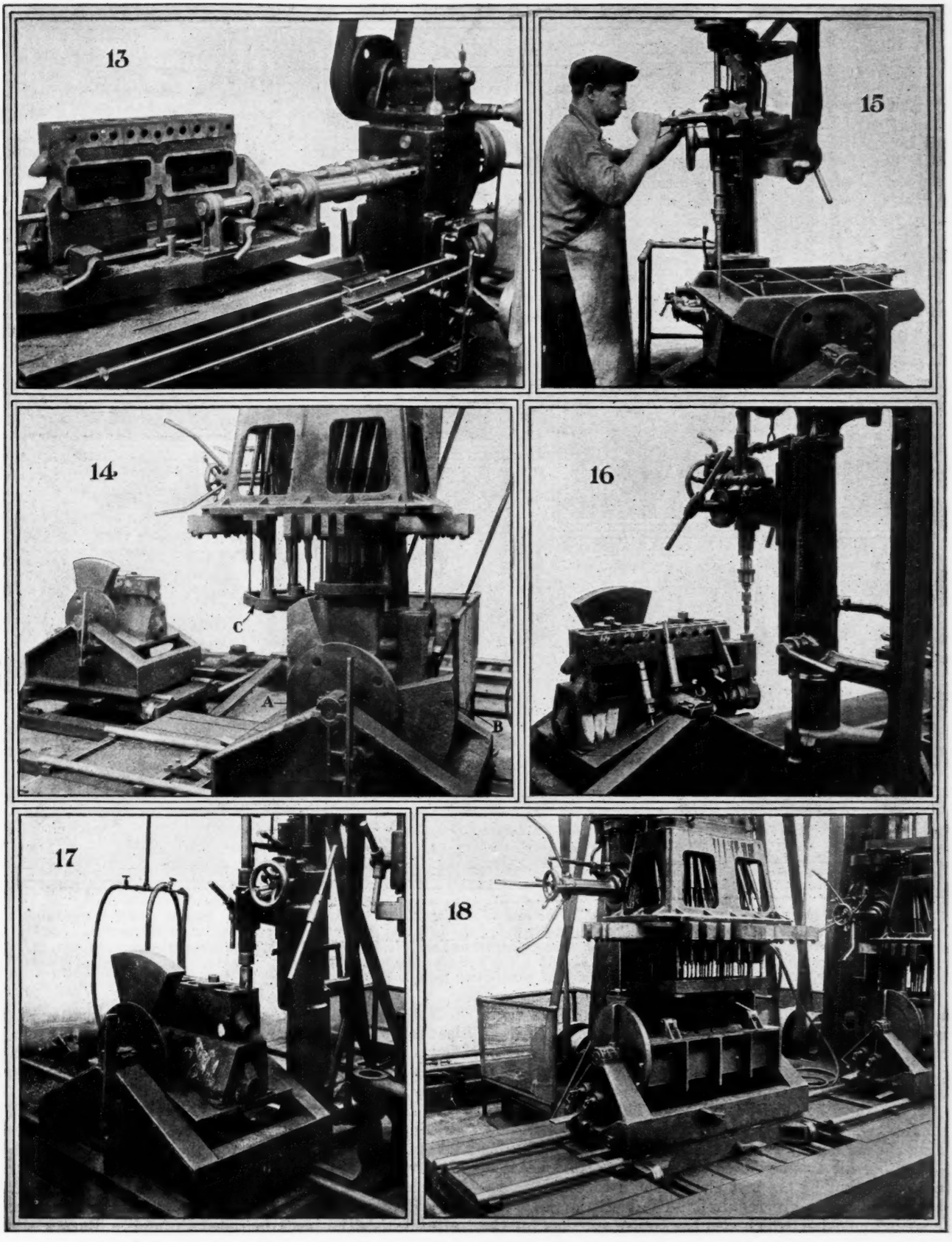
Milwaukee millers are used for milling the water pump



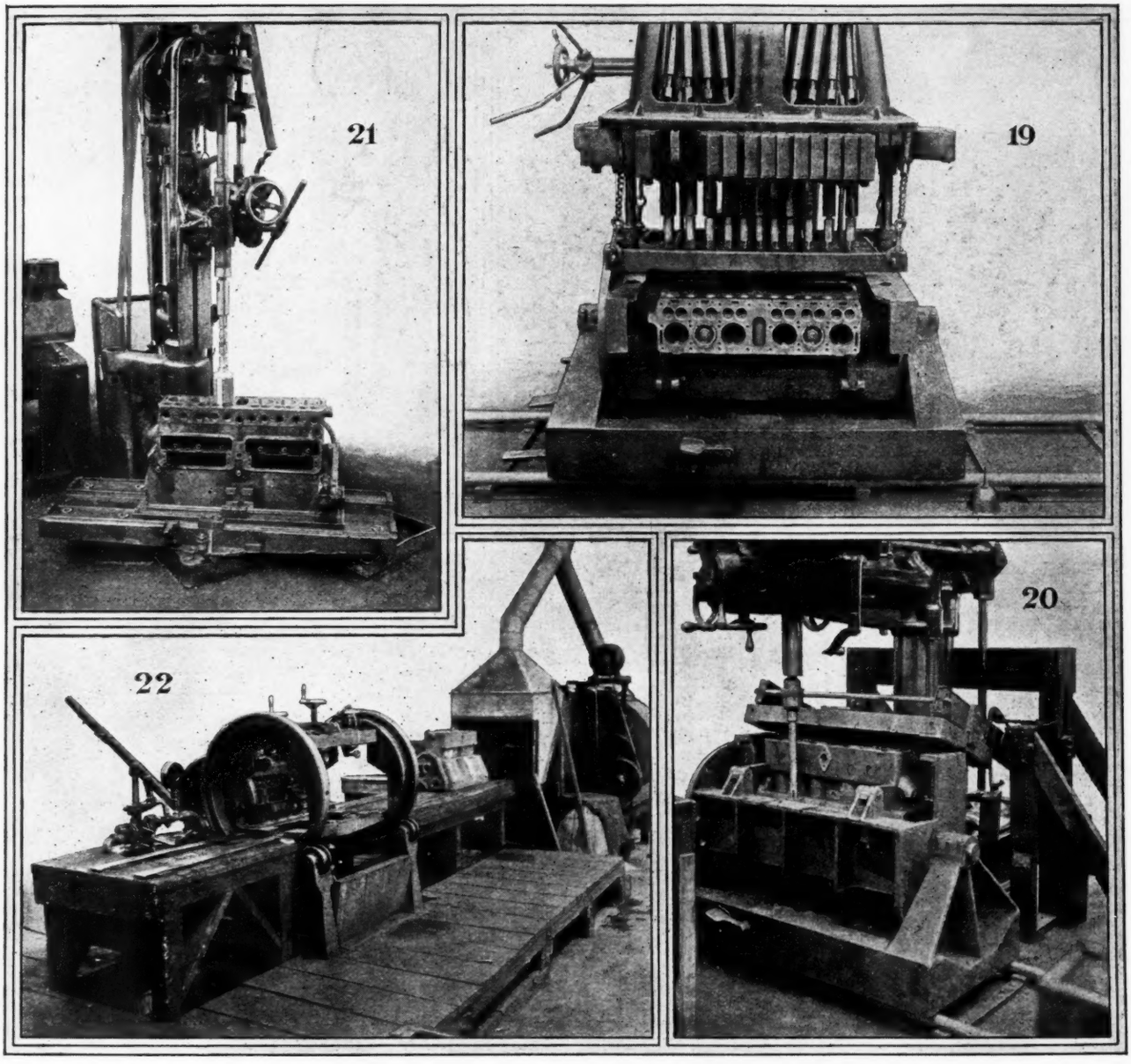
(1) *Inspecting the rough casting on the rough inspection jig.* (2) *Milling exhaust manifold sides on Ingersoll reciprocating milling machine.* (3) *Milling face, bearing caps, top and bosses on side opposite the valve on an Ingersoll six-head, nine spindle, fixed rail milling machine.* (4) *Drilling and reaming two dowel holes from which practically all of the subsequent operations are located.* (5) *Milling the ends of the blocks on a special Ingersoll miller. The small cutter shown at the right of the machine is a traveling cutter described in the text.* (6) *Foote-Burt cylinder boring machine, boring six cylinders at one time*



(7) *One of the two American radial drills used for drilling the fan stud holes and the Hubbard plug holes, as well as the cylinder drain holes.* (8) *Jig for water testing the block. The jig seals the block and a hand pump is used for a 65-lb. hydraulic test.* (9) *Milwaukee miller for the water pump pad.* (10) *Milling the faces of the main bearing holes and the oil sling slots on a Milwaukee miller with a special support arm and an extra long table. This is a straddle milling operation.* (11) *Battery of Foote-Burt multiple spindle drills for the valve and valve guide holes. The first two machines are roughing cuts and the third machine shown in the background is finish cut. The first two have twelve spindles each and the rear twenty-four.* (12) *Railway jig arrangement for a group of four operations*



(13) *Moline boring machine which rough bores the main bearings, the camshaft bearings and water pump support holes.* (14) *Turnover jig operation showing the jig in a Baush multiple with one set of spindles at work. The jig is then thrown over on the shaft A, assisted by the counter-weight B, and the second series of spindles at C brought into operation.* (15) *American sensitive drill press used for tapping some of the holes in the previous operations, employing the turnover jig.* (16) *Barnes power-feed drill press which drills, reams and spot faces the distributor holes. Similar machines are used for spot facing the valve seat and for milling the clearance in the timing gear case.* (17) *Barnes power-feed machine spot facing the top of the valve seat.* (18) *First of a series of five machines operating on one jig carried along on roller tracks. This is a Baush thirty-six spindles*



(19) *Baush thirty-three-spindle, the second in the line of five machines taking care of the intake ports, water inlet holes, etc.* (20) *American radial drill press indexed for the breather holes 2 deg. and 20 min. off the vertical.* (21) *Cylinder bore lapping machine. This is a special carborundum stone machine with spring-out pieces to put the finish surface on the cylinder bore.* (22) *Washing the cylinder blocks in a Blakeslee washer. This is the last operation before the block goes to final inspection from which it is passed on to assembly*

pads (this being a finish cut located from the dowels) and for straddle milling the main bearings and the oil thrower grooves. A battery of three Foote-Burt multiple spindle drills is required for the valves and valve guide holes. The first of these three machines, all of which are exactly alike, is for the valve holes and valve guide holes for six of the cylinders. There are twelve spindles for this operation, taking care of six alternately faced valves. It is impossible to machine all twelve holes at the same time because the tools cannot be brought close enough together, therefore two machines are required. The block is shifted to the second machine, which also has twelve spindles for the six valves. The third machine, however, reams all of these holes at once. A very noteworthy jig is used for these operations. It is an indexing type which comes forward for the six valve holes and moves back for the six guide holes on each of the first two machines. On the third machine, the same type of jig is used except that all of the holes are taken care of on the one machine.

Nothing has been mentioned regarding location of the last few operations, but as indicated, these are all from the dowel holes cut for this purpose. This same applies to the series of operations which are done on a jig which travels along a track in front of four machines, performing the next series of operations. These four operations are all drilling and the jig rolls from one to another on a track before them. The first drill is a Baush multiple spindle drill with forty-seven spindles which take care of practically all holes in the bottom of the block. This is followed by a Hammond radial which taps all of the holes necessary, after which the block is rolled through a Barnes sliding head drill press which chamfers the bottom of the cylinder bore. The last operation in this train is performed on a Hammond radial which screws in the main bearing cap studs and fastens these caps in place.

After the main bearings are in place, the block is passed to a Moline boring machine which rough bores the main bearings, the camshaft bearings and water pump support

holes. There are three cutter bars on this machine which operate horizontally. After the rough boring operation, a finish cut is taken immediately after by a built-up compound tool; that is, the bar which holds the cutter is equipped with gun locks which hold both the rough and finish cutters which follow each other through the bearing.

One of the most interesting jigs in the entire manufacturing scheme is used in the next series of operations. This is a turn-over, indexing jig fitted with counterweights so as to permit ready handling of the block. There are five of these jigs which permits of one being loaded, passed along through the five operations which are in the series, and then being unloaded ready for the next block. These jigs, of course, follow each other through in rapid succession, the entire series of operations being timed so as to meet the nine per hour schedule. The first machine in this series of five is a Baush multiple spindle. The spindles are divided into two parts, the left half taking care of the drilling on the rear end of the block and the right half on the front end of the block. The turn-over jig allows the block to be swung over, first on the rear end, so that these holes can be drilled, and then to the front end, so that the other set of holes can be drilled on this same machine. The loaded jig is then passed along on its roller carrier to the next machine, which is an American radial. This taps some of the holes which were drilled on the previous operations. These include the flywheel housing cap screw holes, timing gear cover holes, etc. On this same machine, the main bearing groove for the oil thrower rings is chamfered also.

The loaded jig is then hauled along to the third machine in the series, which is an American sensitive radial. This drills and taps the water pump body bracket holes and drills the packing holes for the rear main bearing. The fourth machine in the series is a Barnes power-feed drill press, which drills, reams and spot faces the distributor holes. The fifth machine is also a Barnes power feed drill, which spot faces the top of the valve seat, this machine being tilted to take care of the angle of inclination of the valve. The sixth machine is similar to the fifth, being a Barnes power feed type which mills the clearance for the timing gears in the timing gear case. This is merely a precautionary operation, as on a great many of the cylinder block castings this machine does not have to take a cut as there is already sufficient clearance for the gears. On all of these operations, in all holes that the depth is fixed, the drilling is held to a positive stop.

Another traveling jig of the indexing type takes care of the next series of operations, the track along which the jig rolls passing before five machines. The first of these is a Baush multiple spindle drill with thirty-six spindles. On this multiple the jig rolls back and forth so that it is first rolled out for twenty-four stud holes and then moved back in against a rear stop for twelve water holes. The rolling is done on a track on the table of the machine. On this operation, locating is done primarily from the dowel pins and checked by plugs in Nos. 1 and 6 cylinder bores.

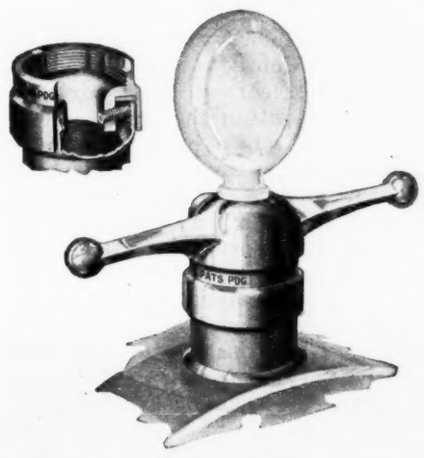
The second machine in this line is exactly the same as the first, being a Baush multiple spindle drilling thirty-three holes at once. These include the exhaust and intake ports, water inlet holes, manifold stud holes, stud holes for the valve cover plate, tappet bracket cap screw holes, generator cap screw holes and camshaft bearing set screw holes. The third machine in the series is an American radial drill in which the throttle control cross-shaft hole is drilled and six stud holes for the valve cover spot faced. The breather hole is drilled and tapped. These operations are located from the casting by a V-block.

The block is then passed to a Hammond radial drill, which taps and spot faces the distributor setscrew holes. It also drills four dowel pin holes for the tappet bracket and drills and reams two dowel pin holes for the generator bracket. Another Hammond radial takes care of the final operations in this series, which are to chamfer and tap the cylinder stud holes, exhaust manifold stud holes, generator bracket and tappet bracket stud holes, the cover plate stud holes and the setscrew holes for the camshaft bearing.

The cylinder blocks are now through the main machining operations and are ready for the final surfacing. This is done on a Barnes power feed drill with a lapping cutter specially designed by the Paige company. This lapper is really an oil stone proposition with the segments of oil stone set into a plug which fits the cylinder bore. The lapper takes care of any size cylinder, so that the same tool may be used for oversize cylinders. This is accomplished by setting the carborundum segments on springs with about 15 lb. tension. These springs hold the stone segments in contact with the cylinder walls and a few revolutions is sufficient to lap the cylinder to size. It is merely a finishing operation for the bore.

The remaining operations are minor in character, consisting of air drilling a diagonal oil hole, pressing by means of a Metal-wood hydraulic press all of the valve guides, making a final water test at 60 lb. pressure, washing the block in a Blakeslee washer and then passing it along for final inspection. Final inspection is done by special inspection gages in the usual way, a very interesting gage used on this work being the Walker micro gage, which measures the cylinder bores for taper as well as out-of-round. It is a dial instrument which affords an exceptionally ready means for checking the accuracy of the cylinder barrel.

Locking Radiator Cap



A locking radiator cap to prevent theft of motometer

AS an outcome of frequent thefts of motometers and radiator caps, the Zinke Company is putting on the market a new Protex-A-Cap that is locked in place by an eight tumbler lock with over one thousand key changes and no master key, precluding the possibility of professional thieves being provided with one or a set of keys to fit. The action of the lock forces a hardened steel bolt into a slot in the adapter ring, which is secured to the radiator neck by three cup point set screws, seated from inside the ring. These screws are forced tightly into the inside of the neck by means of an "L" wrench furnished with the cap. The adapter fits all radiators with screw caps except a few with caps of abnormal size. It is claimed by the makers that the Protex-A-Cap is one of the most attractive radiator trimmings.

Helping Workers to Be Proud of Their Skill

A customer made a complaint. Two workmen were called in to discuss it with him. They felt their employer had confidence in their knowledge, and learned as well some of the troubles of the management. This article traces the development of a labor policy and a plant "personality."

By Norman G. Shidle

MANUFACTURING firms in many ways resemble individuals as to characteristics, habits of thought and mode of action. Most of us are creatures of habit to a large extent, the difference between those who are successful and those who are unsuccessful being somewhat a matter of good habits and bad habits. Being sober with some men is simply a habit; being drunk is a habit with others (or was until Jan. 16, 1920, since when it has been an evidence of one kind of intelligence). Some men are habitually pleasant, others habitually gruff or grouchy. Whatever our habits are, they cast about us a certain atmosphere—which is usually called personality. And that atmosphere, though intangible, admittedly plays an important part in determining our progress or success in life.

So with manufacturing plants does the atmosphere or personality affect definitely the quality and quantity of the work done. The personality of the chief executive may determine this atmosphere to a large extent, but the traditions of the firm itself—how and why and for what purpose it grew—always make a marked impression. Especially is this true in regard to human relationships within the factory. Sometimes an opportunity given to workers to express pride in and knowledge of their work helps materially.

The basis for much industrial unrest is that the human and personal touch of the small shop has been lost in the growth of many modern plants. Not only have some plants lost that touch, but many, especially in a young industry which grew rapidly like the automotive industry, have never had it to lose.

A factory starting to manufacture automobiles to-day cannot, for the sake of human relationships or any other reason, afford to start in like the craftsmen of old with one or two skilled workers and a few apprentices. It is often necessary to start on a comparatively large scale. Nevertheless, tradition and habit of the plant begin to grow with the first day's production. Usually the growth is unconscious. Perhaps better results would be obtained if actions were sometimes regarded as being parts of tradition and an effort were made to build that tradition accordingly. It is perfectly possible, though more difficult, to build good habits and good tradition when starting manufacture on a comparatively large scale. It is possible because it involves no other fundamental factors than when starting on a small scale; it is more difficult because these factors are all infinitely larger and more complex.

To examine human relationships in an individual plant from this point of view, however, an example of the growth of a firm from the old to the new times is of value as illustrating the principles involved and suggesting lines of thought for application on the problems of plants whose difficulties differ to some extent. Such an example was described recently in AUTOMOTIVE INDUSTRIES, in telling the story of industrial relationships at the Brewster factory.

A somewhat similar story is recorded in the interesting development at the Rubber & Celluloid Products Company. This company began many years ago to make hard rubber covered harness and coach hardware. The process consists of covering the metal, on door handles, for instance, with a hard rubber coat, which will not chip off and which presents a good appearance while removing the necessity for constant polishing.

The process requires very careful workmanship and consists entirely of hand work. When the business first started, a few men were trained in the work. They were skilled craftsmen and were proud of their knowledge of a trade in which few of their fellows were capable of working.

Shop discipline in the old days was lax; it would probably be branded as utterly inefficient to-day, but this very inefficiency had its part in building up the tradition which has stood the company in such good stead during recent years. The story is told that it was even necessary on more than one occasion for the boss to run over to the neighboring public house and get Bill and John back to work on an order that had just come in.

But Bill and John always came and worked with a will for they were justly proud of their skill, were always fairly treated in the matter of wages, and felt themselves to be very definitely a part of the company for which they were working.

Because the work is so specialized and because it requires personal skill on the part of the worker, it has been necessary to train all the new workers who come to work in this establishment. Consequently, practically every man now working here learned his trade and gained his working knowledge within the plant.

These old workmen, some of whom have been there for fifty years, brought their sons in to work as they grew up, following the usual custom of the old days. As a result, the spirit of good fellowship and co-operation throughout the shop has been preserved intact through all these years. All the foremen were trained in the shop, and consequently take pride and pleasure in instructing and teaching the newcomers.

The labor turnover is very low, despite the fact that hiring is still done by the various foremen. The success of this policy, however, can probably be attributed

to the fact that the foremen understand thoroughly the ideals, policies and requirements of the company—in fact, they themselves create and carry on those ideals to a large extent. For this reason their success in hiring the right men for the right jobs cannot really be taken as a general argument in favor of this method.

Among other desirable labor results that have been achieved is a sound and intelligent attitude among the men on the wage question. Wages were advanced during the war by the management voluntarily to meet the rise in the cost of living. They were not changed violently and rapidly back and forth as was common in many places. The men were satisfied because the tradition behind them taught that fair play had always been a characteristic of wage adjustments there. Tradition gave them no cause for suspicion. This fact should be recognized as important.

In analyzing the factors of interest and importance in the success of this labor development the following stand out:

1. A healthy and favorable tradition, built up from the inception of the company—a tradition built upon fair-play and honesty in every industrial relationship.
2. Steady employment. The working force at this company had not been cut at the time this article was written, some seven months after the beginning of the present business depression, nor during previous periods of a similar nature. The men here know that their job is good as long as they do conscientious work. In depression periods it is often necessary to shift skilled workers from one kind of task to another, but the men understand the conditions and are glad to do their part in alleviating them.
3. Interesting work. The work is of such a nature that skill must be exercised in every operation. The finished product bears the stamp of personal skill on every piece, and the interest of the workman in making the product perfect is accordingly enhanced. Moreover, his interest is constantly kept alive; it is not dulled and blunted by monotonous work.
4. The men know and are made to feel that they are important, individually and collectively, in the business.

An interesting incident occurred in this plant recently which illustrates strikingly the last point mentioned. A shipment of door handles had been covered according to specifications which required working to extremely close dimensions. When the handles were received by the customer and inspected, very slight variations from the desired proportions were noted in inspection—variations not visible to the eye, but apparent when measured with accurate instruments. A complaint was made about the discrepancies.

The company explained to the customer the nature of the process, the difficulty of working in rubber to thousandths of an inch and the necessity of doing the entire process by hand. The customer was not quite satisfied yet and finally sent a representative to the factory.

The company executive, instead of explaining the matter to the customer himself, called in two or three skilled workmen from the shop. He explained the difficulty to the workmen and asked that they explain to the customer just how the process was done, what the difficulties were and what were the entire facts of the case. This was done and the customer satisfied.

The significant feature of the incident, however, is that this executive showed by his action more clearly than he could have done in any other way, the confidence felt by the company in these workmen and the importance which he attached to their intelligence and skill. The incident is unimportant in itself, but it brings to light a policy and an idea of great significance.

A plant with a good personality is likely to have not only harmonious industrial relationships, but an exceptional vigor and interest in production among its employees. A bad personality or "atmosphere" can be as harmful in the case of a manufacturing plant as in the case of a salesman.

Engineers and Commercial Training

SOME interesting suggestions to young engineers were made in the course of a lecture before the (British) Institution of Electrical Engineers by Llewellyn B. Atkinson. Mr. Atkinson said that although a commercial engineer generally obtained more compensation than a purely scientific engineer, he did not think that the latter had much cause for complaint, as he was engaged upon work which gave great mental and intellectual pleasure. He nevertheless urged engineering students to study the principles of business, finance and economics. Some thirty years ago, the speaker said, methods of organization, both inside works and on outside contracting jobs, were in a very crude and chaotic state, and little information was available relative to the cost of doing work or the output of tools and plant. In these days, however, costs were accurately ascertained and checked by a special staff, and young engineers should on no account neglect that side of their profession.

The training which engineers received, Mr. Atkinson said, should lead to accuracy in thought and expression, but there were little lazy habits of thought and expression which often spoiled otherwise useful work. Language was made to express ideas and thought. The English language was not so full of fine shades of meaning as the French, but it nevertheless offered a great choice of words suited to express kindred ideas. The taking of trouble in thinking out and framing expressions was rather out of fashion, but that made it easier to acquire distinction. When writing letters or reports, young engineers ought to read them over several times in order to be sure that each phrase had only one meaning. It was a good plan to consider oneself as being the receiver of the report or letter and as knowing nothing about the matter. Care came with age and experience. He remembered reading in his father's diary in which he wrote of his engineering work: "It is a pity X. is so careless; we had to re-level a whole section of the railway again, owing to his inaccuracy." Such carelessness might easily have lost X. his advancement at some critical moment, but, as a matter of fact, he became a celebrated engineer and a president of one of the engineering institutions.

As far as possible young engineers should make the acquaintance in proper ways of men of ability and position in their own and allied professions. Such men were usually anxious to help young engineers in their profession, especially if they knew that they were working seriously at the problems of science and industry. One of the greatest powers to be cultivated was an unfailing good temper in times of difficulties and annoyance. A good temper not only saved nerve strain and exhaustion to oneself, but it also helped others to accomplish difficult tasks. Few men realized the power that lay in a smile. It was also good to take part in the social amenities of one's work and the activities of professional societies. The latter afforded a means of bringing young engineers into touch with men they might not otherwise meet.

286 Tractors Average 30.8 Full Days Work a Year

Detailed account of farm owned machines by Federal investigators indicates that in actual operation, the farm power plants are not coming up to the advance announcements of what a tractor should do.

DURING October and November, 1920, representatives of the U. S. Department of Agriculture visited 286 tractor owners in Ohio, Indiana and Illinois. A complete record of all the work done during the year both with tractors and horses was obtained from each farmer. Information from which the cost of using the tractor and the cost of maintaining the workstock could be determined was also obtained.

The investigation was made through the co-operative efforts of the Bureau of Animal Industry, Office of Farm Management and Farm Economics and the Bureau of Public Roads, in accordance with plans outlined at the Farm Power Conference at Chicago, in October, 1919. The object was to obtain information in addition to that already available in the Department of Agriculture and the various State Colleges of Agriculture, which would aid in determining advantageous forms of power for different farms and different conditions.

The average size of the farms visited was 258 acres. This is considerably above the average size of all farms in these States. The following tractor equipment was found on the farms:

1-plow tractor on 1 farm;
2-plow tractors on 174 farms;
3-plow tractors on 104 farms;
4-plow tractors on 6 farms;
5-plow tractor on 1 farm.

Two-plow machines were found on 75 per cent of the farms with less than 160 crop acres, and on 53 per cent of those with 160 or more crop acres.

One hundred and six of the tractors had been in use 1 year, 100 had been in use 1½ or 2 years, 49 had been in use 2½ or 3 years, and 31 had been in use more than 3 years.

On the average the tractors were used for 30.8 full days during the year covered by the investigation. Twenty-three and five-tenths days of this was drawbar work on the home farm, 2.7 days was belt work, and 4.6 days was custom work. Seventy-three of the 286 tractors did less than 20 days work during the year and 26 did 50 or more days' work.

The number of workstock still owned varied from 2 head on 11 of the farms to more than 15 on 5 of the large farms. On the average there were 6.8 head per farm at the time of the survey, and their value was $145 per head. In all there were 1878 head of workstock on the 286 farms and 111 colts less than 1 year of age.

Farm Horse Works One Day in Five

The average number of full days work per year per horse, for all farms was 68.6. On 20 of the farms the workstock did less than 40 full days' work and on 27 they did 100 or more days' work per year.

The tractors did 85 per cent of the plowing on these farms, 73 per cent of the disking, 43 per cent of the harrowing, planking, rolling and packing, 41 per cent of the grain cutting and about 15 per cent of the loading and hauling of hay.

Of 267 men who did spring plowing, 142 did it all with tractors, 121 used both tractors and horses and 4 used horses only.

Of 225 who did fall plowing, 190 did it all with tractors, 27 used both tractors and horses and 8 used horses only.

Of 284 men who did disking, all but 15 used tractors for at least a part of it. One hundred and thirty men used their tractors for cutting grain and 37 for drawing the hay loader. A smaller number used their tractors for any other drawbar operation.

In all, the power for 30 per cent of the drawbar work on these farms, as measured by days of horse labor required for it, was furnished by tractors and the remainder by horses.

The average cost per head of keeping workstock on these farms for the year ending Nov. 1, 1920, was $159, and the average cost per farm was $1,076.

This cost includes charges for feed, at the average price for the year, chores at 25 cents per hour, shoeing, veterinary, harness, interest at 6 per cent and depreciation. A manure credit of $15 per head was allowed.

Feed and Depreciation

Exclusive of grass and stalk pasture, the average ration per horse consisted of 1.3 tons of hay, 1.2 tons of straw, .2 acre of stover, 37.8 bushels of corn and 22.3 bushels of oats. The total cost of feed per head was $134. Based on present prices (March, 1921) the cost of feed per head would be about $80.

The average cost per day of horse labor for the year of the survey was $2.43. Based on present prices the cost on these farms would be not far from $1.50 per day.

The average first cost of the 2-plow tractors was $972, of the 3-plow tractors $1,354, and of all tractors $1,140. The average amount spent for equipment, mostly plows and disks, for use with tractors was about $340. The average value of the horse-drawn implements disposed of after the purchase of the tractors was $12.

The average life of these tractors, as estimated by their owners, is 6.7 years. The annual depreciation of the 2-plow tractors amounted to $164, and of the 3-plow, $217. The annual cost of repairs, including the value of the owner's time spent in repairing the tractors, was $39 for both the 2-plow and 3-plow sizes. The tractors had been out of commission when needed, an average of about 2 days during the year. A little over 50 per cent had not been out of commission at all when needed, and about one in seven had been out of commission five days or more.

The fuel consumption per day for the 2-plow tractors varied from about 18 gallons for fall plowing to about 11

gallons for drawing the hay loader. For the 3-plow tractors it varied from 23 gallons for plowing to 15 gallons for drawing the hay loader. The 2-plow tractors covered 6.6 acres per day in plowing and the 3-plow machines, 8.6 acres. The amount of fuel required per acre by the two sizes was practically the same, 2.8 gallons for the 2-plow and 2.7 gallons for the 3-plow tractors.

Little Difference in Plowing Costs

The average cost per acre of power for the plowing done with 2-plow tractors was about $2 and with the 3-plow about $2.20. The cost of power for the plowing done with horses on these farms was about $2.90 per acre. Based on the present costs of keeping workstock, the cost of power for plowing with horses would be about $1.90 per acre. For most of the other operations the cost of power when furnished by horses was slightly less than when furnished by tractors. The cost per acre of power for disking with tractors was 67c., with horses, 64c.; for cutting grain with tractors, 67c.; with horses. 59c. These figures represent the cost of power only and do not include either the cost of man labor, or that of the implements used.

The average cost per day of 2-plow tractors for drawbar work on the home farm was about $12.65 and of 3-plow tractors about $17.75.

The total cost of power furnished by the tractors for drawbar work at home during the year averaged $341. This drawbar work on the home farm constituted 76 per cent of the total work done by the tractors, and only 76 per cent of the total annual charge for depreciation, repairs and interest on investment, is included in it. No charges for taxes, insurance or shelter are included in the costs for either the tractors or workstock.

Nine of these men had started farming with tractors and the remainder had increased the size of their farms by an average of about 20 acres since the tractors were purchased. There had been no change in size of 172 of the farms, 81 had been increased in size and 24 had been decreased. It is probable, however, that in most cases the tractor was not primarily responsible for the change in size of the farm.

Keeping the Horses

On the 172 farms where there had been no change in acreage the number of workstock had been reduced by 2.2 head, an average reduction of 26 per cent. Forty-four of these 172 men had not reduced the number of workstock, 62 had disposed of 1 or 2 head, 43 had disposed of 3 or 4 head and 23 of more than 4 head. On these 172 farms one horse had been kept for each 28 acres (total acres, not crop acres) before purchase of tractors, and at the time of the survey there was one horse for each 37.7 acres. For all the farms there had been an average of one horse for each 27.6 acres before purchase of tractors, and there was one for each 37.9 acres at the time of the investigation.

On the farms where there had been no change in acreage there had been one horse for each 21.5 crop acres before the purchase of tractors, and there was one for each 29 crop acres at the time of the investigations.

With the tractors doing the bulk of the work of plowing and fitting the ground, the cultivation of corn is the operation which requires the greatest amount of horse labor in the shortest time on most of these farms. However, on only 105 of the 286 farms were all the workstock used for cultivation, and on only 38 of the remainder were they all used for any other one operation. On just half of the farms all the workstock were not used for any one operation.

There were great variations on individual farms in the cost of power furnished by both horses and tractors; and by more careful management many farmers could doubtless reduce this cost. Repair costs and fuel consumption of the tractors could in many cases have been reduced by more careful operation. The cost of keeping workstock could have been reduced on many farms by more careful feeding practices. The facts that on 20 of the farms the workstock did less than 40 days of work per head during the year, and that on half of the farms they were not all used for any single operation, indicate that on some farms there are still more workstock than needed for the system of farming being practiced.

Comparative Cost

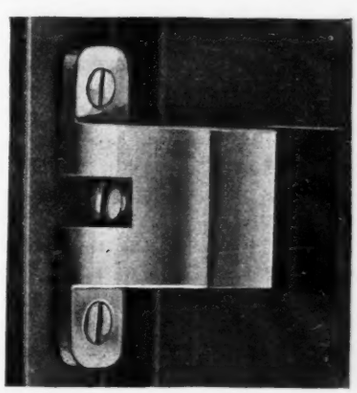
The average annual cost of power for the drawbar work on the home farm which was done with tractors was equal to the cost of keeping 2.1 head of workstock and this is practically the average number displaced per farm. On the basis of present prices, however, the cost of keeping workstock has declined considerably more than the cost of operating tractors.

Since, during the year covered by the investigation, the cost of power on the average farm was no greater than if it had all been furnished by horses, any saving in man labor costs, any gain due to getting a larger amount of work done in a given time and any other advantages connected with the use of tractors which can not be measured directly in dollars and cents might be considered clear profit. It is doubtful, however, if such gains were great enough to balance the cost of operating the tractors on many of the farms where there was no change in acreage and where no workstock were displaced.

An Adjustable Striking Plate

An adjustable striking plate designed to replace the old non-adjustable plate or catch on automobile doors is manufactured by Franklin Williams, Inc. The old-style catch is made with one or two non-adjustable steps and must be fitted very carefully to the jamb of the door, so that when the door is closed it is held firmly against the rubber bumpers. Any wear of the rubber bumpers, lock bolt or catch permits the door to vibrate or rattle.

The Franzen adjustable striking plate can be fitted after it is in position on the jamb. Any wear which has a tendency to loosen the door and cause it to rattle can be compensated for by means of an accessible adjusting screw. By turning the screw to the left the second movable step of the striking plate is moved in. This adjustment again brings the door when closed into intimate contact with the bumper.



The Franzen adjustable striking plate

Closer Observation in 1921 British Tractor Trials

New regulations provide for the gathering of additional data in tests and require more detail as to the competing machines. Promise that Judge's decision will be promptly published upon conclusion of tests.

By M. W. Bourdon

THE rules and regulations relating to the 1921 British tractor trials embody a number of new features which will have the effect of enabling closer observation to be made of the competing machines and enable the Judge's Report to provide more information for prospective buyers than in previous years. The tightening up of the conditions of the trials should also assist competitors and other tractor manufacturers to make useful comparisons between the performances recorded and those of which their own machines are or should be capable.

The most important addition to the regulations is one which specifies that each tractor throughout the whole of the six hours' continuous plowing test which will occur during one of the allotted days shall have a dynamometer permanently in series with the drawbar, so that a continuous record of work done can be obtained to form the basis of the subsequent report. The dynamometers will be supplied by the organizing body, the Society of Motor Manufacturers and Traders, who will not, as last year, be acting in co-operation with the Royal Agricultural Society.

For Draining Machines

In order to facilitate the measurement of fuel and water used in the plowing, all the competing machines must be fitted with drain cocks not less than ⅜-in. diameter clear bore, and each cock must be provided with a nipple to accommodate a ½-in. rubber tubing. It is also specified in this connection that the drain cock must be placed in such a position that the whole of the fuel or water may be drained off without tilting the machine.

Whilst competitors will be allowed to enter two identical machines, but not more, only one machine of each make and type will be under close observation in order that its fuel and water consumption, feed, and width and depth of plowing acreage and negative work at headlands may be recorded. The regulations do not specify whether the trials officials will select the specific machine, or whether competitors will be allowed to indicate which one should have its work recorded in detail.

A modification in the rule relating to fuels states that while the organizing society will provide one grade each of gasoline, benzole and kerosene—the class of fuel to be selected by the entrant at the time of entry—an entrant desirous of running on special fuels may do so, providing the machine be entered accordingly and that the entrant finds his own fuel and sufficient surplus to enable analysis and tests of it to be made.

Among the additional items to be recorded in the report are the best horse-power developed at the declared engine speed, results of tests of winding gear (if fitted), the time required for preparing the machine for plowing, including the fitting and removal of spuds, driving bands, etc., the minimum width of headland required for turning when plowing, and the maximum drawbar effort obtained with the makers' standard spuds or strakes, but without wheel extensions.

A separate report, which will be issued by the Organizers' engineer, will consider the following points in regard to the work done by plows, cultivators and other implements entered independently of tractors: ease of turning; clearance between plow bodies; clearance beneath plow bodies when plow is fitted; range of adjustment to hitch and adjustability to various types of tractors; weight; drawbar pull required per square inch of furrow section, and adjustment for different width and depths of plowing, pitch of body and width of breast.

In order to enable more reliable comparisons to be made between the work done by various machines, tests will be made to ascertain the land resistance in different plots by means of a special plow and dynamometer, while an endeavor will also be made to ascertain the resistance of lands in various fields at varying depths.

Complaints have been made in previous years that, as the trials extended over three or four days, certain tractors were not to be seen at work by the visitors on every day of the trials. To overcome this the organizers will endeavor to keep every tractor at work throughout the whole four days, although they make no guarantee.

As to the Tractor

Besides the points already mentioned to be recorded in the report are the following: weight of tractor; weight per square inch of wheel area bearing on the ground, allowing a sinkage of 1 in.; number of attendants required for plowing; units of work performed during the observed six hours' continuous plowing test; fuel cost per acre per unit of work; water consumption per acre and per unit of work, and price of machine with standard equipment.

The trials this year will have a fresh scene of operations, a point near Shrewsbury instead of near Lincoln. The actual plowing will commence on Tuesday, Sept. 20, though preliminary tests will take place on the preceding Saturday and Monday; Saturday, Sept. 24, will be reserved for final inspection.

Unlike last year, no prizes or monetary awards are offered, the advantage to be derived by competitors whose machines operate successfully lying in the publication of the official report, which will, it is promised, on this occasion be issued within a fortnight of the conclusion of the trials. If this promise can be carried out it will be a considerable improvement, for the Report of 1919 trials required some six months to issue from the press, while the report of last year's trials has not yet appeared.

An Importer's Experiences with Exported American Cars

Much has been printed about automotive export practices and remedies that must be applied, but here we print the effect of bad practice on the man at the other end of the line. How many similar tragedies could be written, due to failure of the manufacturer to follow a definite policy?

By Clyde Jennings

WHAT follows here are the strange experiences of an importer of American cars. It is only fair to say that this man had gained an excellent standing in his own country as an importer long before the comment here was written. It was a fortune of business that circumstances over which he had no control deprived him of the car he had been selling and left him with considerable money, more credit and wide experience to enter the market with another car. He has since been endeavoring to find the proper car for his market.

The experiences here were not written for publication. They are taken from letters to a personal friend in America, with the consent of both parties to the correspondence. For obvious reasons reference to individual firms are omitted.

SOON after this experienced importer began his search for a suitable car he saw the announcement in an American business paper of a car that appeared to meet his needs. He sailed for America and, on arrival in New York, wired and wrote to the factory. He received no reply. It was a long journey to the factory, so he went elsewhere. He found a manufacturer who said he wanted export trade and had a satisfactory car. The importer then returned home.

Imagine his surprise, three months later, when he received a mimeographed letter with his name and address written in ink that differed from that of the body of the letter from the factory he had first communicated with. This letter follows:

> "Kindly pardon our seeming neglect on account of not answering your correspondence, telegrams, etc., more promptly. We have been reorganizing our company here and we are now all ready to do business in foreign countries and have cars to make deliveries. We are painting our cars now ——— and are going to put on the market the classiest —— cylinder manufactured in its class. If you are ready to do business with us and can take cars, we are all set to go.
>
> "We wish to sell our cars f. o. b. ———, and if we make any changes, such as right-hand drive and magneto on the car, we will have to ask an advanced deposit before making any deal whatsoever.
>
> "If interested, we are now ready to take the matter up promptly and your correspondence will have immediate attention."

WE have said that this experienced importer found a manufacturer who said he wanted export trade and was making a suitable car. He returned to his home in fine spirits and prepared to begin an active campaign for the sale of this car at the beginning of 1920. For several months his letters were hopeful, but late in the summer he wrote a letter which contains a review of his situation to that date. In subsequent letters he traces his experiences through to a more or less disastrous finish. Comment on these letters is superfluous. They tell the story:

Sept. 24, 1920

WE started off at the beginning of the year with a tremendous amount of enthusiasm, but our prospects were diminished by the fact that even our first demonstration car did not reach us until June, and finally the first batch of cars for delivery reached us August 13. The situation at that time can be shown by the fact that of the **thirty provisional orders for sample cars that we had for dealers, we were only able to get six of them converted into money, the trade view being that the year was dead and gone,** and it would be hopeless for them to interest themselves in a new car, when, in view of the bad trade situation, they had to fight hard to liquidate their existing contracts.

So there we are to-day, working like Trojans to sell one car here and one car there—a job which would have been delightfully simple if ——— had fulfilled his promise which he made so firmly in person, viz., that he fully realized the importance of early delivery for the export trade. There is no doubt but that we could have had many cars delivered during the spring season of this year. Of course, every factory has its troubles and it is difficult to apportion the blame. All we know is that if the cars had arrived when they were promised we would have had a fine business by now, whereby, on the other hand, we have a load on us which is very hard to carry, and are right at the tail of the procession instead of being well up in the middle, where we expected to be by now.

Equally, too, the non-arrival of any cars and the gradual wasting away of our prospects disgusted the people who were backing me financially, and they have turned their attention to other matters. ——— is astonished at this, but I am afraid in a country like this, where capital

is short and everyone is hard put to it, it is quite unreasonable to ask financial men to sit down with money waiting in the hope of what they style a mythical car turning up some day.

Our attitude is that ——— should take a personal interest in this business until we get started. I have put all my energies and all my money into this business, and have not handled any other vehicle at all (except a few ——— which have just arrived and which were equally such a doubtful starter that we did not include them in our plans), and so it has not been for want of effort that the ——— has not had a good start, **but simply the unfortunate fact of the delivery of the cars to us now, at a time when no one will buy at all.**

American products are not in too great favor. Every importer is full of bitterness with regard to the incomplete condition and bad finish in which the products are shipped overseas, and so, if the American industry is as keen for export business as is commonly alleged, there was never a more important time than now for the American industry to take a collectively and individually strong personal interest in keeping the job going.

Nov. 11, 1920

THE ——— Company has seemed to fail to get a grasp of conditions here. They do not seem to realize the length of time that any new car requires in this conservative market before it can gain popular support. It seems that they expected our public to turn their backs immediately on the Sunbeams and Rolls-Royce and other well-known cars long sold here. Actually the trouble is that there are so many American cars over here that the public will take a long time before they can distinguish between the ——— car, which is obviously good, and all the other nondescript productions which have the advantage over us, in that they have been selling for a year or more and are frequently to be seen on the road.

Obviously it is a case for the American manufacturer to decide whether he believes sufficiently in the future of this market to give whatever measure of temporary support is needed to tide over present conditions. In our own small company we have worked real hard for the past year, we have drawn no salary, we have put all our money into the job and we have marked the cars down to a competitive price level in order to get them established—a price, indeed, which shows us no profit under present circumstances. It is not a case of our having put the price too high that the cars are not selling. We believe that if we can continue in business for another few months we could turn the corner and then go ahead, but we cannot raise any capital here on an American proposition, and we maintain that ———, if he is interested in the export business, should be willing to invest whatever sum is necessary to get this English business established. He would certainly have his full share of profits when they are made, but we tell him strongly that he should meantime take a share of the load.

We maintain what you say in your letter, that ——— is a real fine fellow, but it is impossible to disregard the fact that we would be in a far better position to-day if ——— last November, when he knew that we or somebody else was going to handle his cars in this market, had got some of his staff on the immediate job of getting the right-hand drawings through and getting the necessary parts made, instead of which they were only just starting their experimental work when I visited the factory at the end of January; the sample cars did not leave there until March, and the first batch of regular cars got here in the latter half of August, which meant that this year's business was over before even we got our first cars. On that point I think ——— slipped up.

No doubt the demand for home business was such that the demand at this end became of lesser importance, but that undoubtedly has been our biggest handicap. At the beginning of the year we had the fullest trade support, in the middle of the year the enthusiasm had tapered down, but we were able to get a certain number of provisional orders even on catalogues without seeing a sample car, but when the end of August came dealers' stocks were piled up and they all had to plead that the delay in delivery had spoiled their chance of business. Frankly, I am quite puzzled by the present situation; the factory sales department imagines that we are sitting down at the club drinking tea all day, but it is hardly necessary to remind you that a young and enthusiastic outfit like ourselves, who started in business and put the whole of our personal capital into the job and our reputations as well, we are not going to let the job slip for want of personal energy.

Nov. 25, 1920

WE know that the business has been disappointing to ———, but in addition to being disappointing to us, it has cost us all our capital as well, and it seems now as if his short-sighted action in withholding further advertising support may ruin our plans altogether.

Dec. 1, 1920

OUR situation is as follows: We have had a thin time of it during the past year; we have had many dealers keenly interested and accumulated quite a lot of orders by the middle of summer. As there were no deliveries, these gradually faded away, and when the cars reached us in September, when the year was over, the slump was on, and all our efforts and expenditure of many thousands of pounds only moved half a dozen cars, which was six more than some of the importers moved in the same time. We finally came to the conclusion from undeniable evidence that it was hopeless to attempt to sell at a price which would give to us a reasonable profit.

Unfortunately, just when the clouds are beginning to roll away, ——— has cast us adrift, so to speak, and has withdrawn the advertising and financial assistance which he definitely promised when the writer was at the factory at the beginning of September and on which we banked, because it is quite impossible at the present time to get any financial support for an American car proposition such as ours.

——— has been paid in full for all the cars he has shipped. We, on the other hand, have got all our available capital locked up by the bank which financed the imports, and it seems to us that it is very short-sighted for him to step back now and throw us to the wolves, when we have got the thing just starting to go, and when all that he has promised to do is to reinvest a portion of the money which he has already received from this side in full payment for his cars.

It is no use your manufacturers going into the export business unless they fully understand:

(a) That the export business involves a considerable lot of trouble;

(b) The markets are much more conservative and patience is required, and

(c) When you have got a good dealer, stick to him for a few years.

You cannot change on short notice. For example, in the present instance I am quite sure that ——— does not appreciate that if he lets us go bust on his proposition he will be right out of this market for a long time. The car would have too bad a reputation as a losing proposition for anyone else to take it up.

Cars are not shipped in good condition, and it is very rarely that we get a car of any make but has to be revarnished and the black parts repainted. We unboxed some ——— the other day. (We have not concluded any arrangements with the company—their demands for a contract were excessive and so we are letting the matter simmer until they see daylight.) And, after all their boasted twenty years' experience in export, we find that each car had three separate places where the cross-members of the boxes rubbed up against the panel and not only wore the paint right through, but nearly wore the panel through as well, and so we had a repainting for each of these cars, costing us $120 per car. Also, on two cars the steering gear was so tight that it had to be taken down and the bushings reamed out, showing that the alleged factory test is purely an invention of the publicity manager.

To cut a long story short, the $10 per car which the factory (when basing selling prices here) reckons that we ought to allow to cover the cost of painting up, etc., has been over $170 average on each car, so you can see what a mess this makes of selling prices which have been worked out on a fine limit.

——— shipped us some coupés. When we complained of the paintwork, they put their hands on their hearts and swore to heaven that they had never had a complaint from anybody in all the years they had been doing business. Actually their own representative was with us when some of the cars were unboxed, and he himself was able to pull off the paint a square foot at a time by the simple process of peeling it from the rusty surface underneath. **If the representative had not been here, what a job we would have had to get back the $185 per car which it cost us to repaint and fit up!** The moral is, of course, that if the paint will not stand the sea air, ship them in the gray and make the importer a reasonable allowance, so that the vehicles can be painted over here. As we stand to-day, it is usually a denial of the facts and then an allowance of probably 10 per cent of what it costs to put the job right.

> **I am bound to give my own opinion, as one who has had past experience of dealing direct with the factory and later of dealing with export agencies and branches, that the man in the foreign field derives no advantage whatever from dealing with an export house, but has rather the contrary, since he now has a barrier which prevents free communication with the factory and also the expenses of the export corporation have naturally to be charged to the product and thus become a factor in lessening sales.**

The alleged close connection between the export corporation and the foreign field and the service which it can give to the dealer abroad is more or less a fallacy, and I firmly believe that those factories who establish direct connections with dealers abroad are doing the right thing.

THERE is one other bit of comment in these letters that does not exactly belong in the story that is unfolded above. It is a general observation that is well worth while reading by any exporter of American vehicles, coming as it does from a man who has devoted a number of years of an active and successful business life to the problem. It is quoted below:

> The export trade is going to need a lot more specialization, much more careful handling and some entirely new treatment along the lines of credit. If your people want to have their full share of export business they have got to get away from this cash against document at the factory or at New York. It means that we importers have the whole of our credit locked up for months at New York waiting for shipment, and it is impossible for the business to expand in the way it should.
>
> Take my own case as an example. I have had a large credit established at New York now for eight weeks to take care of cars which were due for shipment; the cars have not materialized and, therefore, the credit is not yet used, but as long as the credit is established at New York it is no longer available here, and so other work that might have been done here **with the same credit has** been standing by. In other words, this means that that portion of my business has been dead for two months.
>
> If, on the other hand, cars were shipped (of course, only to approved persons with all the necessary safeguards) on the 60 days' sight draft or any other form of credit which might be agreed, I could be going on here full speed with the other necessary developments and would have ample time, once I knew that the cars had been shipped, to take care of the payment for the shipment when they arrived.

Certainly there is much in these communications that is worthy of careful reading by American automotive manufacturers who are engaged in or are contemplating the entry into foreign trade. The trader who is wise profits by the experiences of others wherever possible. Certain fundamental mistakes are pointed out here that will make it entirely wasteful for other manufacturers to repeat them.

Imports of Automobiles and Parts into United Kingdom, 1906-1920.

Year	MOTORCYCLES COMPLETE		PARTS	CARS AND TRUCKS COMPLETE		CHASSIS	PARTS	TIRES ONLY MOTORCYCLE	TIRES ONLY CARS	AIRPLANES ETC. AND PARTS
	No.	Value £	Value, £	No.	Value, £	Value, £	Value, £	Value, £	Value, £	Value, £
1906	1755	50,433	30,371 (a)	5776	2,486,337	1,885,323 (d)	.....	.....	.....	.....
7	1770	50,650	28,096 (a)	4819	2,080,266	2,472,520 (d)	.....	.....	.....	.....
8	1340	36,258	29,182 (a)	3830	1,389,552	1,063,077	1,659,832 (e)	.....	.....	.....
9	1442	41,036	29,416 (a)	3666	1,223,053	1,321,596	1,771,960 (e)	.....	.....	.....
1910	1387	44,297	54,951 (a)	4516	1,439,962	1,671,593	2,023,273 (e)	.....	.....	56,206
11	1351	42,086	65,716 (a)	6778	1,717,983	1,723,889	2,549,387 (e)	.....	.....	44,430
12	1363	44,252	192,423 (a)	7373	1,826,678	1,901,829	3,417,420 (e)	.....	.....	80,120
13	1728	60,332	206,451 (a)	6820	1,738,462	1,894,495	3,777,916 (e)	.....	.....	244,096
14	2559	93,121	94,540 (a)	7520	1,858,510	1,651,218	2,973,933 (e)	.....	.....	275,259
15	4531	205,817	52,383	16655	3,118,980	1,135,138	2,183,183	105,123	1,984,563	35,814
16	1192	50,478	52,364	5109	935,618	814,292	1,491,125	93,173	2,207,210	42,120
17	341	16,663	9,741	625	222,088	3,142,028	2,293,948	79,722	1,161,989	409,304
18	6	225	6,085	490	276,368	1,952,165	2,530,667	15,573	602,645	6,859,081
19	1485	79,900	27,672	4442	1,332,451	716,757	3,100,941	37,892	2,053,423	4,173,942
1920	4305	285,820	121,609	33343	10,490,012	4,254,949	8,713,684	(c)	5,577,078 (b)	836,350

(a) Includes tires. (b) Includes rubber tires of all kinds. (c) Not separately classified. (d) Includes parts and tires. (e) Includes tires.

What British Experience Indicates

No economic difficulty in England to-day can be separated from the political program of the British Labor Party. Such a development in this country is very undesirable. But it will not be stopped by fighting it; it can be stopped by making it unnecessary.

By Harry Tipper

A GOOD many years ago, sufficiently long ago for the exact number of years to be unimportant, I was engaged in factory work in the North of England. At that time the trade unionists of the district had just decided to secure their own representative in Parliament and had agreed to pay their candidate his expenses and salary while representing them in Parliamentary Council.

A meeting was called to listen to the man who had been chosen by the trade union officials as the most likely representative. This meeting occurred in the town in which I was located, and as it was a public meeting, I found myself sufficiently interested in the matter to attend.

The hall which was chosen for the meeting was capable of seating five thousand people and it was filled, largely by members of the various unions. The man who had been chosen was a Mr. George Hodges, who became a member of the coalition cabinet during the war, and after he was through with his main speech he was very thoroughly questioned from the floor.

Two things impressed me very definitely about the meeting. First, the intense interest displayed by the audience in the political questions brought up, or rather in the political aspect of the economic questions brought up, and secondly, the keen and practical character of the questions. It seemed to me that these men knew what they wanted, very definitely, and they were prepared to pursue their objects in a practical way with vigilance and with care.

I recognized the fact that meetings of a similar character were occurring in a good many parts of Great Britain and that a definite program, so keenly approached, must develop a large force, influencing the actions of the nation. Since that time it has been interesting to watch the way in which every advantage has been seized upon to secure a little more of the program so definitely begun when the labor unions entered into politics with their own representatives. It was interesting to see the political program itself enlarged in its conception as the power of the labor party defined itself.

The present strike of the coal miners is a case in point. For a long time the nationalization of coal mines has been an important part of the program of the labor party in Great Britain. It is probable that the difficulties imposed by the old land laws and their effect upon the mining towns and villages have had more influence upon the program than the economic differences between employers and employees. The nationalization of mines is not a new desire nor a new platform with the labor party. Every advantage has been seized upon to further this program. In the early part of the war the Government was supported by the labor groups in its program of taking over the control of the mining industry. In the latter part of the war the conclusions arrived at by Sankey Commission were used by the labor party to bring the nationalization of coal mines again to the fore. The strike which occurred since the end of the war, while ostensibly a matter of wages, was in reality another attempt to press the nationalization of mines and bring it more definitely into the foreground.

The present strike is based upon the action of the Government in returning the coal industry to the private owners without giving consideration to the conclusions arrived at by the Sankey Commission and without attempting to confer with the labor party upon the program it constantly advocated.

At the same time the labor party is preparing for the general election, which cannot be avoided much longer. At that time it is likely to put forward a more definite outline of its reconstruction program in the hope of securing the balance of power in the next Parliament.

The condition as exhibited in the present character of the political struggle in Great Britain emphasizes the danger in the complete separation of the workers from the other classes or groups within the population and their cohesion as a separate body in the political groupings within the nation itself. Under such conditions every economic struggle is likely to become a political struggle and every political question is likely to be used to further the economic ends of the party. Instead of being organized more definitely for co-operation, co-operation is made well nigh impossible by the sharp division between the groups and the insistence upon a program of development suitable only to the aspirations of the larger group.

The strong definition of labor aims by the complete trade union organization in Great Britain, coupled with the strong power in the political councils of the country, have gradually developed the allegiance of the individual worker to his union and his party so that it almost overshadows his allegiance to his country.

It is to be observed that the adoption of the Whitley plan of adjustment, the government committees for the settlement of these problems and the willingness of the cabinet to spend time and effort in adjusting economic difficulties have not lessened the number of strikes in Great Britain, nor have they diminished the serious character of the difficulty.

Manufacturers have fought labor unions in Great Britain many times in the past with great severity and they have discarded the elements of co-operation which might have established unity within the individual industrial organization at one time. In this country we should very carefully note the ef-

fect produced by a complete warfare between the wage earners and the owners in developing a more complete state of organization and bringing the questions to a more acute crisis each time difficulties occur.

Our best efforts should be given over to the development of methods of understanding and co-operation within the individual factory so that the trade union would become unnecessary in the individual case.

The completely organized and consolidated organizations in Great Britain, developed on the basis of warfare to seize all the advantages which may be secured, bring the country into the constant danger of anarchy and confusion in the attempt to settle the economic problems by the political action of the labor party.

Under present conditions no economic difficulty in that country can be separated from the political program. The labor organizations are using economic interruptions to force political consideration just as they are using political power to secure economical advantage. Such a growth of organization would be a bad thing for the United States. It will not be stopped by fighting it, but it can be stopped by making it unnecessary.

If confidence and trust in the individual factory is improved by fair dealing and a reasonable measure of discussion and agreement, the program of unionization will become unnecessary to the individual worker and the growth of this cumbersome machinery of development will be prevented from reaching dangerous proportions.

In Great Britain it will require, probably, the advent of the labor party into political power to remove the chaotic condition existing at present and the experiment of a labor government may prove to be almost as expensive to progress as the continuance of the present difficulty.

Causes of Roadside Breakdowns

OUR modern cars have attained such a high degree of reliability that the average automobile owner starting on a trip seldom thinks of the possibility of a breakdown, necessitating a tow to the garage, and it is comparatively rare nowadays that one meets a car stopped at the roadside unable to proceed. Breakdowns, however, do occur, and the necessity of having to be towed home still occasionally confronts the motorist.

In Great Britain the Royal Automobile Club, with a view of being of greater service to its members, has inaugurated a "get you home" scheme whereby it assists stranded motorists to get their cars to the garage and repairs made. It is possible that in Great Britain, where cars were not used much during the war period and where, consequently, a great many machines of early model are still in use, the danger of breakdowns on a tour is a greater bugaboo than it is here. At any rate, it is never pleasant to be compelled to have repairs made in some shop far from home, because of the inclination of repairmen to take advantage of the chance customer in trouble.

In connection with this service the Automobile Club has been keeping account of the troubles causing the breakdowns and has recently issued an analysis of same, which is of considerable interest. In this report the term breakdown refers to a case of mechanical trouble which could not be repaired on the road with the tools ordinarily carried on the car but necessitated the removal of the car to a repairshop.

The breakdowns are classed under seven heads as follows: Power unit, transmission, front axle and steering, road wheels, suspension and brakes, electric lighting failures and accidents. It will be seen from the list that the term transmission includes both the change speed gear and the rear axle. There will probably be no surprise that the first two items together accounted for 77.5 per cent of all the breakdowns. In the great majority of cases when a car is incapacitated, either the motor will not furnish any power or else the power cannot be delivered to the driving wheels. The power unit alone was the cause of 39.6 per cent of the breakdowns, of which ignition failures constituted 13.4 per cent. With one exception this is the highest percentage due to any particular cause. Ignition trouble was very frequent in the earlier cars when the old, crude battery systems of ignition were used. Their frequency dropped a great deal when the high tension magneto with its simplified wiring system and substantial connections became the standard method of ignition, and in view of the fact that British passenger cars almost without exception are fitted with high tension magnetos, the percentage seems abnormally high, especially in view of the high state of technical efficiency which the British magneto industry claims to have attained. The explanation has been offered that the incompetence and feeling of helplessness of the average owner in electrical matters often causes him to give up even though the trouble is of a minor character.

The largest percentage of trouble due to any one cause was due to rear axle shaft breakage—13.9 per cent. It was found that in a great many instances the wheels were loose on the driving shafts, and the play thus created, of course, resulted in the breakage. A further explanation is that it is customary to allow an unusually low factor of safety in the axle shafts, because a slight increase in the shaft diameter means a relatively large increase in the weight of the rear axle. Having a factor of safety of not much over 2 under full load conditions, it does not require greatly abnormal conditions to cause the shafts to snap.

Lubrication failures accounted for 7.5 per cent of the troubles, and undoubtedly the majority were due to neglect of the operator. An equal percentage of breakdowns were due to the universal joints and propeller shafts. These, too, may be largely due to neglect, because the universal joints are mostly rather accessible and their supply of lubricant is not renewed as often as it should be.

Of the remaining cases, the front axle and steering gear were responsible for 5.1 per cent, and road wheels, suspension and brakes for 7.8 per cent. Stoppages at night due to lighting failures accounted for 9.8 per cent, and accidents for 8.8 per cent. This latter figure seems very low, but a logical explanation is that in case of accident to a car covered by insurance the machine is usually hauled to the garage under the terms of the accident policy and no claims are made under the "get-you-home" scheme.

The automobile industry pays the railroads freight charges of $100,000,000 annually.

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Profitable Co-operation

THE interdependent nature of the various units of modern industrial organization has been emphasized on various occasions. The necessity for a recognition of a moral obligation between manufacturers has been discussed as an essential to industrial progress. The term "obligation," however, usually raises in the mind a picture of something to be given up in favor of someone else. This is not always, nor even usually, the case.

There is an obligation on the part of those supplying the automotive industry, for instance, to render to the industry the best service at the lowest cost; to help the automotive industry to make its product of good quality at the lowest cost consistent with such quality. The strange thing is that such service is being offered by many manufacturers but that automotive engineers and designers are not, in some cases, taking advantage of it to the fullest extent.

In the field of castings and forgings, for example, automobile manufacturers have spent considerable money during recent years which might have been saved had the engineers co-operated more fully with the technical staffs of the castings producers and accepted more fully the services which many of them have to offer. Often a casting or forging design can be altered slightly without affecting its essential nature, but in such a way as to reduce considerably the cost of manufacture.

The drop-forging, malleable casting, die-casting, steel casting and other similar concerns have come to the point where, through enlightened self-interest, they are capable of and willing to aid the engineer materially and perhaps save money for him through explaining the various limitations of their individual practice and in suggesting slight readjustments in design to lower production costs without affecting the characteristics of the piece.

Few automotive engineers can be expected to be thoroughly familiar with the details of practice in all of these subsidiary industries, but considerable progress can be made as the constructive co-operation, already manifest to a large extent, is increased and the relations between the engineer or designer and the firms which are to manufacture the parts designed become closer.

Index to S. A. E. Transactions Needed

EVERY member of the Society of Automotive Engineers receives annually two volumes or so-called "parts" of Transactions of the Society containing a large amount of useful engineering data, comprising in fact all matter considered of permanent value which has appeared in the Journal or been presented before meetings of the Society and its sections during the preceding year. Each volume has an index of its own contents, which except in recent volumes is not extensive or well classified, but no general or cumulative index has ever been published by the Society.

As a result it is a tedious and more or less laborious process to locate the information on any particular topic, as this can be done completely only by a search through the twenty-odd volumes.

The Society has recently had compiled in its New York office a complete index covering all its regular publications issued to date. This should be printed in convenient form and be placed in the hands of every member who desires a copy. The need for the index is well recognized. We have yet to hear of an engineer at all familiar with S. A. E. publications who would not be glad to have such an index. The cost of publication appears to be the only reason for not sending the index to press at once, but this cost we feel should not stand in the way for the value of the index will far exceed the cost.

The Society has in the past few years accumulated a considerable reserve fund out of which an appropriation of $30,000 was recently made toward the expense of research work to be fathered by the Society. It is generally conceded that a considerable proportion of this fund can well be spent in making available to Society members existing information on

automotive engineering subjects. A first and very valuable step in this direction would be publication of the index in question. This, however, need not and should not be delayed until the new research work is organized. Now is the time to do it. Funds of the Society are available and simply need to be appropriated for the purpose by the S. A. E. Council.

Factors in Production Costs

THE experience of many workers has been that their wages were maintained only so long as the employer had to maintain them to meet competitive bidding for labor; a cut was made as soon as such competition ceased. This fact has emphasized the theory of perpetual struggle between the employee and employer groups. The result, in such cases, is likely to be unsatisfactory production and financial loss to the employer in the long run, since the type of work produced by grudging workers is never as profitable as that given by enthusiastic workers.

One automobile manufacturer in particular has recognized these facts, although he is not alone in his broad vision of the situation. When the recent depression set in, this manufacturer set his production engineers to work intensively on the task of eliminating small wastes, improving production methods, and thus reducing unit costs. The necessity for such cost reduction was explained to the men, and they were led to understand that the maintenance of their present wage scale depended largely upon the success with which these efforts were rewarded. In this way the assistance and co-operation of the workmen were gained.

The production manager of this concern recently presented to the management a comprehensive report, showing the various ways in which it had been possible to improve production methods and thus reduce unit cost. The wages of the workmen have thus far been maintained without decrease.

At some future time it is altogether probable that this manufacturer, like most others, will find it necessary to reduce wages. But he will be in a position to do so without losing the valuable enthusiastic cooperation of his workmen, because he has already demonstrated in this very practical manner that his honest desire is to keep wages high as long as possible, rather than to lower them on the first excuse that may present itself.

And this ability to maintain wages is obviously due to the saving made possible by production improvements, since the selling price has not been increased. The price of the product has in fact been reduced.

Isolated Plant Battery Rating

A STORAGE battery rating means little unless the basis of the rating is accurately specified. Realizing this fact, the Standards Committee of the S. A. E. has evolved standard rating rules for the various classes of batteries used in automotive practice, namely, lighting batteries, batteries for both starting and lighting and batteries for isolated plants. The necessity for having different ratings for batteries for the different uses arises from the fact that the rating test must, if possible, simulate the operating conditions for which the battery is intended.

The ratings for both lighting and combined lighting and starting batteries have proven entirely satisfactory, but there has been considerable dissatisfaction with the rating standard for isolated plant batteries. This rating standard calls for an intermittent discharge at a 24-hour rate extended by three periods of rest to a total time of 72 hours. The idea in view in adopting this intermittent rating was, of course, to approach in the rating test as closely as possible to service conditions.

Most of the early small isolated plants were sold mainly with a view to their use for farm lighting, but recently the use of these plants as a source of current for heating (sad irons and various electric heating apparatus) and for power has assumed considerable importance. It is evident that where there is sufficient power load on the circuit of the plant to load the battery to capacity, it may easily happen that the battery will be completely discharged in from six to eight hours or in even shorter time. Of course there will always be some plants which carry practically nothing but lighting load, in which case the intermittent rating will more nearly represent the conditions of actual use.

It will thus be seen that the conditions of storage battery operation in small isolated plants now vary so widely that no single rating rule can possibly parallel all of them, and in view of this fact it would seem advantageous to return to the 8-hour continuous discharge rating standard. To do so would lead to two desirable results: It would be a simpler matter to check up the rating and, owing to the fact that such a rating approaches closer to the conditions of most severe service, there would be less chance of misunderstanding and disappointment on the part of those not familiar with storage battery characteristics.

Business Men Reading Books

THERE is in New York a small and informal club of business executives who have known each other for many years. They meet occasionally and discuss business frankly. At a recent meeting only one of these men was able to say that his business curve was maintaining the proper slope. This man is a publisher of business books. During the recent let-up in many business activities, his products have been in greater demand. He said that especially the younger men in industry are buying and reading books on topics bearing on their business specialty. This is certainly a good indication.

A BRIEF card from Carlisle P. Winslow, director of the Forest Products Laboratory, brings the welcome intelligence that the appropriation for this institution was increased approximately $100,000 by the last Congress. In addition to congratulations to the laboratory staff itself, AUTOMOTIVE INDUSTRIES wishes to congratulate those of its readers who acted upon the suggestion made some weeks ago that they recommend such an increase to their congressmen.

Willys Takes Field to Force Sales

Carries to Dealers a Fighting Message

Declares He Is Just As Able As Ever to Keep Overland in Front Rank

TOLEDO, April 4—After spending ten days in the company of dealers and bankers in Western and Northwestern States, John N. Willys stopped here to-day on his way to New York, more enthusiastic than since 1916 and assured that "vigorous prosperity" is on the way.

He reported that he had met more than 2000 of the Willys-Overland salesmen and distributers, and that everywhere business is going forward. Reports indicated that the company sales had increased 94 per cent last week over the second week preceding.

"I am returning with greater enthusiasm and more optimism over the future of Willys-Overland than I ever felt before," declared Willys. "Conditions in the West and Northwest are already much improved—far more than I expected to find.

"During the past two weeks I have talked with our dealers gathered in Chicago, Kansas City, Oklahoma City, Dallas, St. Louis, Omaha and Minneapolis. The meetings are the most enthusiastic I have attended since 1916.

"Anyone who has any doubts about Willys-Overland coming back strong after this readjustment is due for a surprise.

"I found that the rumor manufacturers had circulated a lot of wild yarns about my own plans and I took a lot of pleasure in telling my old friends—among them hundreds of dealers who have been with me from the beginning—that I'm just as determined to-day as I ever have been, and just as able to keep Willys-Overland in its front rank position.

Willys Overland First Interest

"Willys-Overland is my first and my outstanding interest. During the past few years expansion and financing have occupied most of my time.

"To-day Willys-Overland, and every other automobile company, needs a reawakening of enthusiasm among its dealers and salesmen along the firing line. So now I'm trying to be useful in the sales department.

"Yes, I'm going to be on the road again in a few days to talk with more dealers. It stimulates me and encourages me more than I can describe to see the wonderful response our dealers give when they know we are all set and our program is straight ahead.

"I believe to-day, as I have for years, that Willys-Overland has the most able group of real go-getting automobile dealers in America. And while I don't expect nor do I predict any rushing return of business, I know that the Willys-Overland sales organization still has its oldtime wallop.

"Every dealer has a lot of hard work ahead, but we all have something well worth working for.

"In both cars we are building now in Toledo, we are putting forth the best product we have ever had in our history. Orders show a steady increase. Last week's retail reports from the field show a gain of 94 per cent.

"I have found, too, that our time payment plan, which is extremely liberal to the public, is a great help to the dealers right now. In short, every factor is helping us now toward prosperity."

VOLUME OF BUSINESS EQUALS YEAR AGO!

NEW YORK, APRIL 5—Sales managers who are mourning because "there is no business" might do well to go off in a corner and quietly consider these facts:

Business today, in spite of all reports to the contrary, is moving at a pace only 20 per cent slower than that of a year ago.

General sales in the United States for January, 1920, amounted to $45,178,711,000. This was considered a phenomenal showing.

Notwithstanding the "depression" sales in January, 1921, amounted to $38,506,907,000. This was 85 3/10 per cent of the business done a year ago.

Bradstreet's commodity index shows a 43 per cent decrease in prices over the same period a year ago and, since the country is doing 85 per cent as much business in dollars as it did a year ago, the figures indicate an increase rather than a decrease in the number of sales.

Somebody is getting this business. More business is being done by some organizations than they ever did before.

The sales manager who is waiting with folded arms for "better times" and charging small sales to stagnant business conditions, might well adopt this motto:

"Let's Go!"

WAR DEPARTMENT BUYS PLANES

WASHINGTON, April 4—The War Department has ordered 200 pursuit planes and 35 bombing planes for the use of the American army. The pursuit planes will be the Thomas Morse type and will be built by Boeing Airplane Co. of Seattle. The bombing planes will be of Marlin type and will be built by the L. W. F. company of College Point, N. Y.

Car Plants Leading Cleveland Industry

Employment Gains 24 Per Cent for March—Other Lines Show Falling-off

CLEVELAND, April 5—The automobile industry continues to set the pace for business in this city. On April 1 the automobile plants of the city were employing 1500 more men than they were Feb. 28. That is a gain of 24 per cent and outstrips gains by various industries. The survey was made by the Cleveland Chamber of Commerce in cooperation with the United States Labor Department, and the figures are genuine. The eighteen plants in the automobile industry that reported had 8103 employees on April 1, as compared with 6532 on Feb. 28 and 5940 Jan. 31.

Comparing the figures for the automobile industry with the record of all other lines of production in the city, shows the progress made in the automobile industry to be remarkable. There are 97 plants reporting to the committee in charge of the survey. These plants under normal conditions employ approximately 100,000 men. The total number on the rolls April 1 was 59,202. That is 470 less employees in April than were working on Jan. 31 of the present year.

The Stearns factory is being operated at 100 per cent production; Winton, which has been idle for some time so far as production of new cars was concerned, will be in capacity production of 10 cars daily on May 1; Peerless is operating at 50 per cent of capacity, and the Kurtz plant, which is a newcomer in the local field, is turning out five cars a day and selling all of them. Grant has been enjoying a gradual increase in business in the present year; April orders assure production on a larger basis than in March, and this is also true of Chandler, Cleveland, Templar and other cars.

A trip to the dealers disclosed that all are optimistic and are selling cars, although they are hustling harder for business than they did a year ago.

FORD MAY BUILD CARS AT TROY

TROY, N. Y., April 5—After inspecting the site at Green Island on which he will build a large plant, Henry Ford stated to-day it was quite likely the factory would be used for the manufacture of automobiles rather than tractors as has been predicted. He added that Thomas A. Edison would construct a plant adjacent to the Ford factory which will be operated by power taken from the Ford power house.

Would Divert Car Tax to Highways

Senate to Get Bill Changing Fund Plan

Proposal Is Digest of Legislation Long Approved by Industry —Aids Forest States

WASHINGTON, April 4—Senator R. N. Stanfield of Oregon has prepared an amendment to the Federal highway bill providing that the application of receipts from a sales tax on automotive products should be used exclusively for the construction and maintenance of highways. This plan would abolish the present system of making highway appropriations out of general funds as called for under Federal Aid legislation. Briefly, the proposal is a digest of plans advocated by automotive organizations for several years though there is no specific provision for a system of national highways.

Basing calculations on Treasury receipts for the last fiscal year, it is estimated that a sales tax would yield approximately $145,963,035.62. With the various tax proposals calling for a higher rate on automotive products a larger sum would be available under the Stanfield amendment. The Federal Government under the Federal Aid Act has been appropriating $100,000,000 for good roads. The distribution of this fund has provoked widespread opposition and proposal for the national highway system was the outcome.

Senator Stanfield is a newcomer to Congress and is a wealthy sheep-grower. E. J. Adams, his secretary, is largely responsible for the measure, as he assisted in framing the good roads plank in the Republican party platform at Chicago last summer. He was also State Highway Commissioner for Oregon for several years and is familiar with the highway transportation problems.

Apportionment Difficult

One of the great difficulties or inequities of the Federal aid plan has been the apportionment. For instance, New York state with millions of automobile users could obtain but a small portion of the Federal aid. Another amendment in addition to the tax plan provides that after deduction not to exceed 5 per cent for administration, 12 per cent of the funds available annually for the Federal highway activities should be apportioned to Federal Land states in proportion to the number of acres in the reserves of each State and providing that the amount so apportioned shall not be less than 10 cents per acre per annum, these funds to be used for construction and maintenance of roads wholly, or partly, within the Federal Forest reserve and the remainder, or 88 per cent of the funds available annually, to be apportioned to the States in proportion to the number of motor vehicles licensed during each year.

Senator Stanfield says that the apportionment for the Forest Reserves is to carry out the pledge of the Republican party adopted at the Convention which provides that these public lands shall be a controlling factor in the apportionment of Federal highway funds. He contends that it is clearly unfair to withdraw from settlement large areas exempting them from taxation within these States thus preventing their development without providing some adequate means of extending aids equal to what they should but do not receive in taxes.

Approximates State Tax

The 12 per cent is approximately equal to what these lands would pay in state and county taxes if they were privately owned and subject to taxation. The apportionment of the remainder of the funds (88 per cent) is made according to the vehicle licenses used in each state. "If the funds are raised by sales tax imposed on motor vehicles, cars, and accessories," he said "then this method of apportionment is exact and equitable which merely means that the contribution by the manufacturer to the Government at the time the vehicle is sold follows the vehicle into the State and is there used for construction and maintenance of roads for the same vehicle to run on."

In support of this plan, the Senator asserts that "if the funds are raised by an appropriation of the general fund this method of apportionment is still as nearly fair and exact as may be written

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FARMERS FORM LEAGUE TO FIGHT SALES TAX

CHICAGO, April 4—While sentiment in favor of imposition of a Federal sales tax in lieu of imposts which now are a drag on industry is growing steadily in the industrial districts of the country its proponents will have a hard time getting it through Congress. One of the formidable obstacles in its way will be the opposition of the farmers. The Farmers Federal Tax League, with headquarters here, has been organized for the avowed purpose of fighting a sales tax. This organization contends that "powerful interests are preparing to shift further the burden of taxation upon the farmers and the farmers must organize to make felt their influence if this attempt is to be prevented."

N. A. D. A. Strongly Protests Dumping

Congress to Get Nation-wide Appeal for Protection from Unfair Competition

ST. LOUIS, April 4—Harry G. Moock, general manager of the National Automobile Dealers Association, has sent a letter to the secretary of every dealers association, local and State, urging the adoption of a resolution protesting against the reimportation from England and France of American made motor vehicles which are being brought into this country duty free and thereby competing unfairly with dealers in this country.

In his letter, Moock points out that American business needs "stimulation and not further depression; confidence and not doubt; enthusiasm and not apprehension." After telling briefly of enormous quantities of American made automotive equipment which has been purchased for a song by British and French speculators with the expectation of dumping it on American markets, he says:

"Congressional leaders do not fully know how their program menaces our industry. So it's up to us to acquaint them with it. It's up to us to ask Congress to give us such protection as will equalize the prices of these re-imported goods with the prices of American manufactured goods. We want you to ask Congress to enact anti-dumping legislation which will put a tariff on this re-imported material so that it cannot be sold at a half or a third of the value of American products."

To Notify Representatives

Each association is advised to send to its United States Senator and representative copies of the resolution it adopts. The resolution proposed by the national association follows:

"WHEREAS, American business has been seriously stricken during the recent period of post-war adjustment,

"WHEREAS, in addition to the natural depression resulting to the automobile business from this fact, the motor vehicle industry has been an especial target for discrimination, and

"WHEREAS, the automobile industry paid in Federal excise taxes in 1920 the sum of $144,000,000 to the Government, license and registration fees to the state governments of $100,000,000 and personal property taxes of approximately $80,000,000, a total of approximately $325,000,000.

"WHEREAS, the prosperity of the in-

(*Continued on page* 782)

Erskine Not After Studebaker Control

Denies Alliance With Durant and Fish—Company Has Record Business

"THE sales of our cars for delivery in the months of April, May and June are far in excess of any previous year in our history and we are trying to increase production at all plants with the expectation of producing and selling 20,000 cars in the second quarter."

—Statement by President Erskine of Studebaker Corp. to stockholders.

NEW YORK, April 5—Official denial that control of the Studebaker Corp. now rests with W. C. Durant, F. S. Fish, chairman of the board, and himself, was made to-day by A. R. Erskine, president of the company, in a statement read at the annual meeting of stockholders held in Jersey City. After referring to newspaper reports to this effect, Erskine said:

"I feel it my duty to inform our stockholders that there is not the slightest foundation for such reports. We know of no interests that are trying to obtain control of the corporation and believe such an undertaking to be extremely unlikely.

"We have not been, nor will we be, interested in acquiring a controlling interest in the stock of the corporation. In fact, such an effort by anyone would, in our judgment, be hostile to the best interests of the corporation, its customers, and its stockholders. We prefer to see the number of our stockholders increase, with the widest possible distribution of our stock, and to this end we shall continue to manage the affairs of the corporation in a manner that we hope will deserve the continued confidence and support of the automobile and security buying public. During the past year the number of stockholders increased from 3000 to 12,000, including 3000 employee stockholders."

Durant Purchases Denied

It has not been denied that Durant has purchased large blocks of Studebaker stock in the open market, but so far as can be learned this has been a purely speculative venture. He bought when the stock was from 20 to 30 points lower than it is now in the firm belief that it was far below its real value, and that there would be a substantial increase in a short time. He also advised his friends to buy for the same reason. It was reiterated by Durant's office to-day that he had no intention of trying to get control of Studebaker or to exert any influence over its affairs. Durant is much gratified, it was stated, at the prosperous condition of Studebaker affairs. The statements of Erskine and Durant seem to dispose effectually of reports which have been current in Wall Street for several weeks. Technical control of the company apparently rests in the hands of the banking house of Goldman, Sachs & Co. where it has been for some time.

Highly significant of the conditions now prevailing in the industry is the statement of Erskine to the stockholders that the company has been able to reduce its bank loans materially and that orders for the second quarter assure the largest three months business in the history of the corporation. In this connection he said:

"It will be gratifying to our stockholders to know that our sales of the first quarter were beyond our anticipation and that our net profits substantially exceeded the dividend requirements of both the preferred and common stock. In March we retired $2,500,000 in bank loans and have now outstanding $7,000,000, with over $5,000,000 bank balances. Our collections are exceeding our disbursements, and outstanding bank loans will probably be liquidated before the summer is over.

"The sales of our cars for delivery in the months of April, May and June are far in excess of any previous year in our history, and consequently we are trying to increase production at all plants with the expectation of producing and selling 20,000 cars in the second quarter which will be our record business for any three months. In June the plants will be operating at capacity of 8500 cars per month, which can thereafter be maintained indefinitely."

Stockholders Propose to Take Over Revere

FORT WAYNE, IND., April 2—An entirely new company will be organized to take over the plant of the Revere Motor Car Corp. of Logansport, Ind., according to the plans of the committee recently appointed to formulate plans for the future of the plant. It is proposed to have the new company purchase the plant at a receiver's sale. This committee consists of Judge R. B. Gentzel, of Chicago; Senator P. S. Armatage, of Owensville, Ind.; H. C. Springer, Garrett, Ind.; L. C. Thompson, Trenton, N. J., and John Miller and H. A. Kraut, of Logansport. Copies of the plans for the future of the company have been mailed to all stockholders of the present company and an invitation has been extended to all to become stockholders in the proposed new corporation.

STINNES BUYS FIAT SHARES

NEW YORK, April 2—A dispatch from Rome says Hugo Stinnes, the German industrial leader, has purchased from the Italian Fiat Corp. 200,000 shares in the electrical works in the Italian Tyrol known as the Alpinen Montan Gesellschaft. Stinnes, therefore, will become a director in the largest Italian electrical works and will exert much influence over the Fiat company.

Truck Sales Heads Plan N.A.D.A. Branch

Will Seek Approval of Organizing Truck Dealers Division of Association

DETROIT, April 2—Plans and policies outlined by the directors of the National Association of Motor Truck Sales Managers, which include active co-operation with the National Automobile Dealers Association, promise a season of activity. The meeting was the first held since the induction of Don Whittaker as secretary, and his recommendations covering future efforts of the association met with unanimous approval.

The subject of co-operating with the N. A. D. A. in the organization of a motor truck division of that organization was recommended by a committee, and the directors instructed Secretary Whittaker to begin negotiations with Harry G. Moock, general manager of the N. A. D. A. In many cities truck dealers now affiliate with the passenger car associations of the city and State, and also are members of the N. A. D. A. The successful efforts of the latter organization in promoting the interests of the automobile dealer are recognized by truck men and are prompting efforts to form a strong division to co-operate. Details of the truck division will be worked out later.

Promotion of motor transport, rural motor express and highway engineering also will be major future efforts, and periodical bulletins will be issued in support of road bond issues for distribution through dealers and distributors, and members of affiliated associations. Educating the public in proper truck operation and in promoting faith in the truck as the proper short haul medium, also will feature the activities.

A research department for the collection of data on sales work, general and territorial requirements, statistics on truck production, registration laws and license fees, road mileage, new loading devices and data on foreign business are proposed, and a legislative department which will co-operate in combating adverse legislation aimed at the motor truck will be maintained.

To Extend Secretarial Work

One of the chief functions of the secretary's office under Whittaker will be the employment clearing house where records of all truck salesmen will be kept. Efforts in that direction will be devoted to elevating the standard of salesmen through searching investigation of their records, results of which will at all times be available to manufacturers seeking salesmen or salesmen seeking positions. Attempts to curb the unscrupulous dealer and eliminate the "trade-in" evil will be made, and a meeting to discuss this matter will be held in New York soon, where a plan for overcoming it will be outlined.

Akron Plants Spurt to Meet New Demand

Goodyear Pushes Schedule to 17,500 Tires Daily—General Production 50 Per Cent

AKRON, April 4—With many automobile factories resuming operations, and with the vast surplus of tires of two months ago almost exhausted, marked improvement is being shown in the tire industry and Akron's many rubber and tire factories have begun to recover encouragingly from the slump which has been in force for the past nine months.

Nearly all Akron factories have begun to increase production and many are re-employing men on a large scale. This week Goodyear will put on 1200 of its former employees, and Firestone will re-employ 1000. Firestone has been adding to its force every day for the past few weeks and for the period extending from March 1 to April 30 will have re-employed at least 2000 men, officials announce.

Goodyear has formally announced a 33 per cent increase in production, effective at once, which will carry production up from 12,000 casings and 13,000 tubes daily, to 16,000 casings and 16,000 tubes a day. Firestone will increase production 50 per cent this month and go to 15,000 tires daily. Both factories are running two eight hour shifts daily, and operating on five-day weeks. Goodyear soon will go to a five and one half day week.

Although Goodyear officially announces a production increase to 16,000 tires a day, unofficially it is stated that the company's production this week will be pushed to 17,500 tires daily, and possibly to 20,000 tires by April 15. This unexpected increase has been brought about by heavy original equipment orders from automobile factories, received since the company announced the increase to 16,000 tires daily on Friday of last week.

Most Companies Report Gains

These two companies unquestionably are leading in the spurt taken by the tire industry. The other large companies of Akron, Goodrich and Miller, have made no formal announcement of production increases or re-employment of former tire builders. Smaller companies however are falling in line and several of them have restored operations to a basis of nearly 100 per cent normal.

In fact everything indicates that the back bone of the tire industry slump in Akron, which threw over 50,000 out of work in this city alone, has at last been broken. It is also significant that unless tire companies plan further production increases, the possibilities of an actual tire shortage this spring will be greatly increased. Vast surplus stocks of tires, stored in Akron and in other cities by Akron companies, have dwindled rapidly, through production being held down though sales have steadily increased. With this surplus exhausted rubber factories are now ready to get back to a basis of conservative production commensurate with demand.

Resumption of operations by automobile factories is perhaps predominantly responsible for the stimulated tire building activity. Goodyear alone reports that original equipment orders for April show an increase of 70 per cent over original equipment business placed in March. Goodyear also is reaping the reward of a very extensive and constructive advertising campaign, for consumer sales are increasing without any added sales effort. Firestone also finds its advertising campaign of the past year being reflected in consumer sales. Goodrich, more conservative in advertising, is not reporting any material increase in production.

Unemployment Dwindling

Through increased activity of rubber plants, Akron's army of unemployed is dwindling, and is now down to under 15,000. With many construction jobs opening up in the city, this number will be less than 10,000 and possibly down to 5000 before May 1. Smaller rubber companies planning material production increases within the next 60 days will help to absorb this remaining number.

All companies in hiring men are showing preference to former employees who are married. At the same time men now in the factories are being weeded out. This is being done to increase efficiency per man in the factory, and also to gain a more stable class of factory operatives, so as to give the city home owners, discourage the transient, floating element of labor from drifting into the city, and hold down labor-turnover when times again are prosperous.

A canvass of rubber factories in Akron shows that all are operating on a general average of 50 per cent normal production. This is a 100 per cent improvement over conditions in January.

The results of this canvass in other plants conducted especially for AUTOMOTIVE INDUSTRIES, show—

Plant Schedules High

General Tire & Rubber, nearly 100 per cent normal with one shift.

India Tire & Rubber, about 65 per cent normal. Orders running ahead of production, which will be increased this month.

Mohawk Tire & Rubber, 35½ per cent normal. Orders double production and 80 per cent higher than in January.

Portage Rubber Co., producing 80 per cent normal. Expects to reach normal operation within 30 days.

Rubber Products Co., operating 75 per cent normal in tire departments, and 65 per cent normal in other departments. This company never dropped below 60 per cent of normal production even at the lowest ebb of the tire industry slump.

Amazon Tire Co., now on basis 80 per cent normal, due to increases in dealer orders.

Star Rubber Co., 65 per cent normal. Plans substantial increases in next 60 days.

Swinehart Rubber Co., 70 per cent normal.

American Tire & Rubber, nearly 100 per cent normal.

Thus it may be seen that with all companies operating in excess of an average of 50 per cent normal production, the tire industry is now being operated on a basis of over $250,000,000 annually or nearly $27,500,000 a month.

Goodyear Enforces New Wage Reduction

Retrenchment Program Calls for Cut of $5 a Tire in Overhead Costs

AKRON, April 4—Although the Goodyear Tire & Rubber Co. has officially announced that it will increase production 33 per cent, going to a basis of 16,000 tires daily by April 15, and will employ 1200 former tire builders, a severe retrenchment program is being continued in the general and factory offices and in many factory departments.

Under the refinancing negotiations for $85,000,000, and under dictation and suggestion of banking interests negotiating the immense loan for Goodyear, the company is attempting to cut actual manufacturing cost nearly $5 per tire, by reducing overhead, by combining jobs and by laying off several hundred office employees, many of whom have held executive and semi-executive positions at commanding salaries. The company will also enforce a 10 per cent cut in wages this week in the factory. Salaries previously were reduced.

The Goodyear "Tire News," said to be the largest corporation magazine in the world, and at times of peak production having a monthly circulation of approximately 100,000, has been discontinued with the April number.

Elimination of this magazine will mean a vast saving to the company it is stated. Whether or not the publication will be revived will depend entirely upon the matters of reorganization of the company and future developments in the tire industry.

In the factory offices, a reduction of 76 per cent has been made. This has compelled the company to dispense with many of its high salaried men in official and semi-official capacity. In the general offices, departments have also been cut to the bone. It is understood the factory and general offices, which have functioned separately and in different office buildings, will be combined.

Wage Based on Living Cost

The matter of contemplated wage cuts, was protested by the Industrial Assembly of Goodyear, composed of employees, and was held in abeyance until the projected reduction was arbitrated. It will become effective this week. According to Vice-President and Factory Manager P. W. Litchfield, the lowering cost of living, and the economic readjustment of prices, makes a wage and salary cut equitable at this time.

Litchfield prepared charts for employees showing that there has been a 25 per cent decline in house rents in Akron, a 50 per cent decline in room rents, and an average general decline of 27 per cent in retail commodity prices. Litchfield assured employees that a 40 hour week would be maintained, and that the factories might go to 45 hours a week.

Syracuse Factories Resume Activities

Whole Colony of Industries Revives As Franklin Production Continues Heavy

SYRACUSE, April 2—With the re-establishment of a 100 per cent operating schedule by the H. H. Franklin Mfg. Co., the entire colony of Syracuse industries interested in automotives has felt a revival during the past few weeks. In addition to the Franklin interests, however, there has been a general, though less active, return to production.

Ever since the middle of February the Franklin company has been operating on what they term a normal schedule of 40 cars per day. Not until very recently, however, have the other plants felt the effects because only now are new stocks being bought for production.

In meeting the 40 car schedule the Franklin company is employing 3000 men, and according to a representative of the company there has not been any reduction in the wage scale, the employees being paid on the same basis used before the shut-down last fall.

There are 2000 men less, on the Franklin roll now, than there were last year, the company operating on a single shift. All equipped operating buildings are in use now, but the million dollar addition built last year is being utilized for storage space. The Franklin company has relinquished leases on seventeen storage locations around the city. Eventually the new building will be equipped for production the company having originally planned on going right into the new area. The operating schedule with 5000 employed on two shifts was 75 cars per day. This figure probably will not be reached very soon, company officials feel.

Present Schedule Oversold

The present schedule of 40 cars per day has been oversold, according to sales department figures. The program for the entire month of March called for 1031 cars delivered. Up to and including March 26, 832 of that number had been shipped. Orders accepted for March delivery totalled 216 in addition. The sales department reported 236 additional March orders which could not be filled until April, and 825 April shipment orders. The normal April production schedule calls for approximately 1050 cars and already more than that have been sold.

The company has installed a conveyor system in the final assembly which will permit of a production of 125 cars per day. Only part of the system is now in use.

Franklin activity is reflected in the business of the Dyneto Electric Co., which is on a 25 per cent basis, about fifty units per day going to the Franklin plant. Several foundries, including the Straight Line Engine Co., S. Cheney & Sons, the M. L. Oberdorfer Brass Co., have felt the effects of the revival. Other Central New York plants which have increased production are the Halcomb Steel Co., the Penn Spring Works, the A. D. Clapp Mfg. Co. of Auburn, and the Brewer Titchener Co. of Cortland.

At the several gear works in town, there is an indication of a generally increased interest. The Brown Lipe Chapin Co. is on a 25 per cent basis, their production going in small quantities to a number of manufacturers. The same situation exists with the Brown Lipe Gear Co., the New Process Gear Co., and the Durston Gear Co.

The Dyneto company is gradually being readjusted as a result of the action of several months ago resulting in the plant being taken over by a friendly committee of creditors.

Senate to Get Bill Changing Fund Plan

(*Continued from page* 775)

in any legislative act because the number of motor vehicles licensed in each State fairly reflects the wealth, population and total road mileage within the State. If this factor is used in apportioning funds, it is easy and inexpensive to ascertain the size of the factor by merely getting a certificate from the official having charge of the motor vehicle department."

The two amendments will be introduced at the next session probably at the same time that the Senate committee on Post-offices and Post Roads report out the bill for a national highway system. These amendments are expected to wipe out opposition to national highways from Western States.

According to the views expressed by the Oregon Senator, "the users of motor vehicles receive direct money benefits from every mile of road improved, in the form of decreased repair bills, extended life of the vehicle, increased mileage on tires and gas, and increased efficiency. Over poor roads this would be purely a waste. The saving of this waste invested in better roads is economy and good business on the part of motor owners, therefore, a tax imposed on the sale of equipment at its source is more than saved in the reduced cost of operation if the tax so collected is devoted to building more and better roads.

"True, lands and property other than motor vehicles receive benefits from highly improved roads, but lands and other property also contribute to the common cause when they pay direct property taxes for the county market roads which far exceed in mileage both State and National highways."

TO CONTINUE PRESENT PLANT

MOLINE, ILL., April 4—Borg & Beck Co., automobile clutch and service parts manufacturers, will extend their Clearing, Ill., plant, but this development does not mean that the central works will be transferred from this city, officials explained. There have been persistent rumors to the effect that such a change was pending.

Container Car Wins Success in Trial

Store Door Deliveries by Railroads Shown Practical in Test by N. Y. Central

NEW YORK, April 4—Preliminary experiments with its new "container cars" for store-door delivery have been a complete success, the New York Central Railroad announces, and the system will be expanded as rapidly as it is possible.

The freight car, with four portable containers which can be filled and sealed by a shipper in his own warehouse and then loaded on the car truck, has just completed successful trips between Chicago and Cleveland, and a second car of this type will be tried this week on the Boston & Albany for the shipment of shoes. A steel express car, with nine portable containers, has finished successful trips between this city and Chicago with the Twentieth Century and other fast trains, and is declared to be successful.

Experts of the New York Central consider their experiment a radical departure in transportation. It is predicted that wide use of the new car will save not only demurrage and truckage, but clerk hire and large losses by theft.

The new system provides "compartment" service for freight and express by means of specially-devised "containers" and "container cars," which in effect gives to shippers the use of individual traveling safe-deposit vaults of various standard, interchangeable sizes which are carried locked and intact from the door of the shipper to the door of the receiver of freight. The "containers" or huge steel boxes, are readily removable from the car body and are packed and locked at the factory of the shipper, carried by motor truck or electric car to the railroad and hoisted aboard the car, and at destination are carried by truck to the store door of the consignee, where they are unlocked and unloaded at convenience.

Unload Direct to Shelves

Goods may be stowed in the "containers" in cardboard or even paper wrappings, without need for costly wooden boxes or crates, and the shipment travels untouched to the door or platform where the packages may be unloaded directly onto shelves.

"The savings effected by the new system in loss and damage of freight prevented, in wages, in boxing and crating of individual small shipments," says the New York Central, "are expected to be exceeded in amount by the greater use of moving equipment—railroad cars, trucks and draws—as well as of freight-terminal facilities, whose limits of capacity in periods of heavy demands for transportation have restricted the size of the 'peak-load' and adversely affected commerce."

G. M. C. Takes Loss on Its Inventories

Liberal Allowance for Depreciation Cuts Heavily Into Earnings for Year

NEW YORK, April 5—Net sales of the General Motors Corp. for the year 1920 were $567,320,603, which was an increase of $57,643,909 over sales for 1919. The net income was $93,150,308, but $47,766,787, which is slightly more than half that amount, was deducted to cover Federal taxes, to write down inventories, for depreciation of plants, and for operations conducted in assisting employees to buy their own homes. In addition to these deductions, reserves previously set up were utilized to provide for all contingencies and write down the value of inventories and other accounts to a conservative level. The net profit for the year was $45,383,521.

The report shows that the demand for the corporation's products, which had been very urgent during the first part of the year, was sharply curtailed in September. Inventories reached their peak about the middle of October, but by Dec. 31, notwithstanding shrinkage in sales, there had been a net reduction in inventories of approximately $25,000,000. Inventories were further reduced by $25,776,112 at the close of the year by the charging off of all obsolete materials as well as adjusting values to cost or market, whichever was the lower.

While all known losses and write-downs of inventories had been taken care of in closing the books as of Dec. 31, it nevertheless has been deemed advisable to set up a special reserve of $7,500,000 to take care of possible losses in respect to outstanding commitments for materials undelivered and for other unforeseen contingencies.

Taxes Make Heavy Inroads

A table showing the progress of the earning power of the corporation shows that the net earnings of 1918 were $35,285,597, of which practically $20,000,000 went for Federal taxes, $13,504,000 for interest and dividends, and $1,667,000 was retained in the business. Net earnings in 1919 were $91,181,222, of which $30,000,000 went for Federal taxes, $22,713,000 for interest and dividends and $38,468,000 was retained in the business. The net earnings for 1920 were $47,248,383, of which $3,894,000 went for Federal taxes, $29,117,000 for interest and dividends, and $14,236,000 was retained in the business.

The report, which was submitted to the directors to-day, says:

"The officers and directors of the corporation have thought it unwise to undertake the production of materials that do not relate largely to the automobile. Thus, a comparatively small portion of the total tires produced are consumed by the automobile manufacturer, the larger percentage being sold directly to users of cars for replacement purposes; the greater part of the production of sheets and other forms of steel is consumed by trades other than the automotive industry; therefore investment in these fields has not been made. By the pursuit of this policy, General Motors Corp. has become firmly entrenched in lines that relate directly to the construction of the car, truck or tractor, but has not invested in general industries of which a comparatively small part of the product is consumed in the manufacture of cars.

"The rapid development of the industry has called for equally rapid changes in the character of manufacturing plants, but by constant reinvestment and rebuilding, the General Motors Corp.

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CONDENSED COMPARATIVE CONSOLIDATED BALANCE SHEET OF GENERAL MOTORS CORPORATION AND SUBSIDIARY COMPANIES AS OF DECEMBER 31, 1920 AND 1919

ASSETS	Dec. 31, 1920	Dec. 31, 1919
Cash in banks and on hand	$47,608,949.90	$48,231,200.04
United States Government bonds	41,262.21	213,218.49
Marketable securities	34,096.31	989,448.36
Sight drafts against B/L attached	9,534,264.37	10,945,061.06
Due from United States Government on war contracts	.....	304,334.80
Notes receivable	13,449,376.90	1,776,104.31
Accounts receivable, customers and others	22,091,095.33	24,668,766.74
Inventories at cost or less	164,684,678.72	128,696,651.70
Prepaid expenses	1,891,854.06	582,355.64
Total current assets	$259,335,577.80	$216,407,141.14
Investments in allied and accessory companies, etc.	$67,985,100.31	$53,398,491.26
Real estate, plants and equipment	248,788,765.63	176,888,467.00
Deferred expenses	6,282,606.27	2,719,357.18
Good-will, patents, copyrights, etc	22,414,818.11	20,323,888.81
	$345,471,290.32	$253,330,204.25
Total assets	$604,806,868.12	$469,737,345.39
LIABILITIES, RESERVES AND CAPITAL		
Accounts payable and trade acceptances	$30,140,278.35	$37,846,313.36
Notes payable	72,421,451.45	6,812,318.68
Taxes, payrolls, and sundries accrued not due	11,122,197.78	11,521,770.64
Accrued dividends on preferred and debenture stock, payable February 1	1,018,943.73	889,882.00
Total current liabilities	$114,702,871.31	$57,070,284.68
Purchase money bonds	$1,629,070.14	$150,000.00
Purchase money notes, account Fisher Body Corporation stock purchase	9,840,000.00	21,840,000.00
	$11,469,070.14	$21,990,000.00
Reserve for depreciation of real estate, plants and equipment	$33,285,988.04	$23,084,824.58
Reserve for employes' investment fund and sundry contingencies	5,123,100.01	4,041,072.69
Reserve for Federal taxes and extraordinary expenses	4,942,116.42	36,262,472.70
Reserve for bonus to employes	1,558,950.87	505,579.85
Special reserve for unforseen contingencies	7,500,000.00	.....
Total reserves	$52,410,155.34	$63,893,949.82
Capital stock:		
Debenture stock 7%	$25,153,500.00	.....
Debenture stock 6%	56,366,900.00	$68,339,300.00
Preferred stock 6%	16,183,400.00	16,957,000.00
Common stock no par value 20,284,580 shares issued and outstanding at $10 per share (including 254,764 shares held in reserve account subscriptions not fully paid, at $10 per share, $2,547,640)	205,393,445.25	.....
Common stock ($100 par value)	239,500.00	153,411,000.00
Total capital stock	$303,336,745.25	$238,707,300.00
Bonus stock awarded	.....	7,848,570.00
Interest of minority stockholders in subsidiary companies with respect to capital and surplus	1,614,809.08	1,585,343.57
Surplus	121,273,217.00*	78,641,897.32
Total capital stock and surplus	$426,224,771.33	$326,783,110.89
Total liabilities, reserves and capital	$604,806,868.12	$469,737,345.39

Note—The corporation had a contingent liability of $1,416,333.11 on December 31, 1920, on account of sight drafts discounted.

*Included in this amount is $68,332,415.90, covering paid in surplus growing out of the issuance of stock for cash and for acquisition of properties.

Conditions Brighter in Northwest Zone

Business Shows Decided Improvement in Clties—Credit Situation Reported Improved

MINNEAPOLIS, April 5—That the automobile business is looking up in Minneapolis territory is evident. Dealers are beginning to smile and gloom is being dispelled. Business in the larger cities is the first to look up, such as Duluth, St. Paul and Minneapolis. As for the country, not so much can be said as yet. Possibly one reason for the situation is that the driving season in the country will not begin in earnest until winter's mud has been dispelled. The financial situation is not such yet that country dealers can get the cars they want. The truck men feel pretty well because hundreds of road and other contractors are feeling the return of the building season, after a long lapse. The tractor situation is not so bright.

Manufacture of tractors has been resumed by the Minneapolis Steel & Machinery Co. after a long shut down. This month, 200 additional men will be put on with the reopening of the foundry. Tractors have been shipped already to Venezuela and Czecho-Slovakia. All tractors on hand with this representative concern are sold for delivery or future delivery.

Northwest credit conditions have improved in the last six weeks, but are not at normal. Of the total accommodation by the Federal Reserve Bank in the district March 4, loans were largely agricultural, or $41,000,000. There is more unemployment, and a decline in both wholesale and retail prices of commodities is shown from Feb. 1 to March 18.

Crop Season Brings Confidence

Confidence seems to prevail as the Northwest enters the new crop season. In parts of North Dakota and Montana, farmers cannot repay borrowings until the new crop is harvested. In other parts, say South Dakota and Minnesota, farmers can liquidate heavily when they release their present holdings of grain. The new wheat area is reduced some, but the total grain crop average may go above normal. Farmers are slow about paying, and based on $1,000 average loan, they are said to owe above normal, as follows: Minnesota, $200, or $1,200; South Dakota, $250, or $1,250; North Dakota, $400, or $1,400; Montana, $300, or $1,300. These are owings to country banks.

The Pence Automobile Co., one of the first to receive big shipments of cars, the Buick, has received from the new St. Louis factory three trains of 38, 39 and 55 freight cars each. The load is four automobiles per car. Actual offers for more than half of the total have been received already. The first train made the trip from the factory by daylight, stopping as optimism creator, at many points.

75 BUICK PURCHASERS JOIN IN DRIVEAWAY

DETROIT, April 4—Four special trolley cars will convey 75 new Buick owners and friends to the Buick factory at Flint, Wednesday, where, following a banquet at the Durant Hotel, they will be given their cars for the overland journey to Detroit.

The party represents purchasers of cars from the Starkweather Buick Co. at the Detroit automobile show during which C. C. Starkweather and his force of eight salesmen sold 78 cars. Three of the purchasers are out of the city and will not be able to make the trip returning from Flint. The sheriff of Genesee County and staff will escort the procession to the Oakland County line where the sheriff of that county and staff will bring the party to the Wayne County line.

Colonel Harry Jackson the Detroit traffic chief and his staff will meet them at the city limits and escort them through the city to the Starkweather service station where the cars will be washed and turned over finally to the owners. Starkweather will turn over to the factory official, a check for $158,075.67.

Northwest Business on Scale of Last Year

PORTLAND, ORE., April 1—Spring weather burst upon Portland with the arrival of Easter last Sunday, and Portland dealers have more than been satisfied with the resumption of buying. In fact, many of the dealers are comparing the present period with last spring, which was the finest in business history here.

A resume of business during the month of March disclosed the fact that dealers on the whole had an excellent month, and that business has increased steadily from the first to the last of the month. One dealer reported 90 new and used cars sold, while another reported 60, both figures running close to last year's March records. New cars are beginning to experience a strong demand and some of the dealers are forecasting a shortage later in the spring. Many who have been waiting for a possible reduction of price are realizing that indications do not point to a decrease and are getting into the market.

AUSTIN MACHINERY TO REBUILD

CHICAGO, April 4—The Austin Machinery Corp. will rebuild the plant at Winthrop Harbor, Ill., which was recently destroyed by fire. Pending the erection of the new plant, the manufacturing operations of the company will be continued at Muskegon and Toledo. The company has also recently consolidated into its group the plant of the Fairmont Mining Machinery Co., Fairmont, W. Va.

Business Caution Again in Evidence

Chicago Reserve Bank Finds Continuance of Post-War Conditions Hurts Trade

CHICAGO, April 1—The same caution in business in the Middle West that was apparent several months ago has again appeared, attributable, according to the Federal Reserve Bank of the seventh district, to the following factors:

1—Uncertainty on account of a continuance of high retail prices for many articles that make up the daily living budget.

2—Curtailed building operations due to high cost of construction and the consequent shortage of housing and further increase of rentals.

3—The attitude of greater resistance by wage earners to any lowering of the pay scale.

4—The turning of the attention of farmers from marketing to new crop preparations, thus delaying liquidation of farm holdings.

5—The continued heavy demand for money and the high interest rates.

More favorable conditions are reported from the agricultural districts of which Chicago is the center, weather conditions during the past winter having favored increased production although at the same time some apprehension has been created in regard to the forthcoming crops by the scarcity of snow during the past season.

What the mild weather has done for the farmer which is reflected in the continuance of frozen credit as a factor in the liquidation of loans, has been to turn his attention to spring work rather than to continued marketing. There is a feeling among the farmers that the best way to recoup the losses sustained through the decline in prices is to feed their corn and oats to live stock, a more merchandisable product. Farmers are taking a more hopeful view of the situation though there are indications of a 10 per cent falling off in the prospective wheat acreage.

PACKARD DISCUSSES SALES

DETROIT, April 1—Directors, dealers and branch managers of the Packard Motor Car Co. closed a three-day session with factory officials here this week. Those present represented New York, Philadelphia, Boston, Chicago, Baltimore and other large cities. President Macauley and other executives of the Packard organization spoke to the dealers, all of whom expressed the opinion that the improvement noted in the automobile industry in the last two weeks gave every promise of continuing throughout the spring and summer. Sales resistance, and in fact all of the obstacles encountered by the distributing organization, were discussed and plans evolved for overcoming them. Production is starting up strongly, demand being pronounced for the light six.

"Full Speed Ahead," Factory Order

Production Hitting on All Cylinders

Output for March Doubles February—April Schedules Are Increased Heavily

DETROIT, April 5—With all automobile factories in production and the majority hitting on all cylinders, a rapid return to prewar normal is apparent in the remarkable step-up in production for March when the output in Detroit and Michigan totalled 105,245 cars. This compares with 53,040 in February, an increase of approximately 100 per cent.

The real significance of the figures is best seen in a comparison with March of last year which in many factories established a record for production up to that time. The total manufactured last March was 176,831. The total for the month just ended was 59.5 per cent of the March 1920 output.

Further investigation reveals that last month's output was in reality 66 per cent as great as last March for the reason that the Willys-Knight and Overland production last year was 17,700 cars and there was no production at those plants last month. Overland and Knight production was resumed last Monday and while there is no set schedule for April, output is expected to reach around 5000.

While Ford was responsible for 72,000 of the cars represented in last month's figures, the actual increase exclusive of Ford production in March over February was 15,205 or 84.3 per cent.

Schedules for April production in all factories have been increased from 10 per cent to 35 per cent, though executives of the most successful companies contend that the total output for 1921 will be between 50 per cent and 60 per cent of 1920 which was regarded as an abnormal year and a production record that probably never again will be reached.

Speed Up on Parts Making

Many factories were enlarged during the abnormal period in an effort to speed up production. With a prospect of maintaining output at about 60 per cent of last year's figures, or on a basis of close to prewar normal, proper utilization of spare factory space and equipment is a problem. A majority of the manufacturers are solving it, however, by speeding up in the parts manufacturing end. This is regarded as a logical plan and certain to prove of great advantage to the owner in quicker and better servicing.

When not driven to undue haste in turning out spare parts, as was the case last year, parts will be turned out more nearly perfect as to quality and in quantity sufficient to keep all dealer service stations well stocked. Some manufacturers also are contemplating side lines, allied with automobiles, but no definite step in this direction has been taken.

Dodge swung into production in March and while the factory started on a 10 per cent basis, output was increased rapidly each day until the plant now is on a 60 per cent production basis which will be maintained indefinitely. It is significant with all manufacturers that employee forces have been curtailed to a minimum and while many factories now are operating on a 60 per cent production basis and some close to normal, they are doing this with forces cut to from 40 to 70 per cent.

Efficiency Lowers Overhead

Despite the fact that all factories now are in operation, many on schedules close to normal, former employees may be seen loitering about the factory gates and streets without work and with slight possibility of their securing reemployment. A high degree of efficiency reached and maintained, manufacturing executives declare, has lowered the overhead in a great measure and is permitting operation at a profit in the face of the production curtailment as compared with last year.

Sales Managers Too Busy for Convention

NEW YORK, April 6—The meeting of the Advertising Managers Council of the Motor and Accessory Manufacturers Association, which was to have been held at Washington April 14, 15 and 16 has been postponed until some time in May or June. The general subject will be, "How the Wealth of Government Resources Can Be Utilized by the Automotive Advertising Managers" and the meeting will be held in Washington. The chief reason for the postponement is that advertising and sales executives are too busy to attend at this time because of the general business revival. It also has been deemed advisable to wait until the new administration becomes more definitely settled and in a better position to outline a program of assistance.

Goodrich Meeting, April 20

AKRON, April 5—The B. F. Goodrich Co. has issued to stockholders a call for the annual stockholders' meeting on April 20 at New York and for a special meeting of stockholders the same day to ratify the proposed retirement of 11,880 shares of preferred stock of $100 par value each which the company has acquired. Retirement of these shares will reduce the company's stated capital from $108,412,000 to $107,224,000.

N. A. C. C. Committees Press Legislation

Important Conferences Scheduled with Government Department Heads—Trade Improves

NEW YORK, April 7—Pratically all the directors of the National Automobile Chamber of Commerce will be in Washington to-morrow to attend a series of conferences which will be among the most important for the industry since the armistice. Here is the schedule:

Highways committee, headed by Roy D. Chapin, will confer with President Harding and Secretary Wallace of the Department of Agriculture. The purpose of the calls will be to present arguments in favor of the Townsend Federal highways bill.

A special committee headed by H. H. Rice, vice-president of the General Motors Corp. and comprising J. Walter Drake, Alvan Macauley, R. E. Olds and H. M. Jewett, will confer with Herbert Hoover, Secretary of Commerce. This committee was named at the request of Hoover to co-operate with him in the development of foreign and domestic automotive trade.

The tax committee, headed by C. C. Hanch, will confer with Secretary of the Treasury Mellon and Senators Penrose and Smoot in regard to the taxation program outlined by the N. A. C. C. The committee will urge a program of strict economy and a tax on retail sales if additional revenue is needed.

Directors of the Chamber at their monthly meeting here yesterday went on record as opposed to the adoption of legislation for a soldiers' bonus at this time but declared for proper care of disabled soldiers. Opposition to the bonus was on the grounds of economy.

Business Gains General

Reports received by the directors showed that business is improving in virtually all parts of the country with the exception of the Dakotas and in the south, outside of Georgia and Florida. Passenger car sales are much better even in Iowa and Kansas.

Production reports for March showed an increase of 63 per cent over February and that business for the month was 42 per cent of the total for March, 1920, which was the largest single month in the history of the industry. Business in February was 58 per cent greater than in January. Carload shipments for March were about 16,500 and there were about 10,000 driveaways.

President Clifton of the N. A. C. C. will open the service managers convention at Buffalo, May 17.

G. M. C. Writes Off Inventory Losses

Will Complete Construction Program This Year at Cost of $10,619,521

(*Continued from page* 779)

has kept well in advance and its factories may now be considered in satisfactory condition. The great plant of the Cadillac Division, in Detroit, which will be fully occupied in the summer of 1921, is the last large item of reconstruction to be finished. There still remain several small and somewhat antiquated plants that have been relegated to minor manufacturing or assembly purposes, but these items are of little consequence and may be abandoned at a not distant date.

"Constant change has necessitated careful study of customers' demands and possible improvement in the character of product. In addition to the studies conducted by the individual manufacturing divisions of the corporation, there has been organized and established at Dayton the General Motors Research Corp., with complete organization and facilities for systematic experimentation. The corporation has thereby insured the proper checking of all developments of the several divisions and has made possible independent research and study of the problems of the industry, abstract from the routine of manufacturing.

"Rapid increase in production has also necessitated the building of houses for the accommodation of factory employees, notably at Flint and Pontiac, Mich.; Janesville, Wis., and Walkerville and Oshawa, Canada. These houses are being sold to employees, as the corporation does not intend to carry the investment longer than necessary, and already 76.7 per cent have been sold.

"The construction program, inaugurated in recent years, was about completed during the year 1920 by the expenditure of approximately $79,161,951. There remains for expenditure during the year 1921 the sum of $10,619,521."

Directors to-day declared a dividend of 25 cents a share on the common; $1.50 a share on the 6 per cent preferred; $1.50 a share on the 6 per cent debentures, and $1.75 a share on the 7 per cent preferred.

New Cadillac Plant Replaces 77 Buildings

DETROIT, April 2—General offices of the Cadillac Motor Car Co. now are in the new Cadillac plant on Clark Avenue. The purchasing, accounting, manufacturing, sales and advertising departments will begin to function at the new home Saturday.

Some idea of the size of the plant may be gained when it is known that all factory operations which heretofore have required 77 buildings in Detroit, will be carried on in it. There are 8 large buildings, chief of which is the manufacturing building, 800 by 600 feet, with a floor space of 970,000 feet. Raw materials are received at one end and the Cadillac chassis leaves under its own power from the other end.

Conveniently near the manufacturing building is the heat treatment building, 500 x 80 feet. The assembly building, second largest in the row, is 800 x 300 feet, with a floor space of 620,000 feet. The storage building which adjoins the assembly building is 480 by 140 feet and has storage space for 1000 Cadillacs. The factory service department is housed in this building.

Executive offices are in a handsome administration building, 225 by 50 feet, equipped with all conveniences. The power plant is one of the most modern in the country.

Particular thought has been given to comfort and surroundings of the 6000 Cadillac employees in the installation of locker rooms sufficient to give each worker a steel locker, special bridges, walks, etc., that will permit a great saving in time and a minimum of confusion in entering and leaving the plant. The welfare department and First Aid hospital is so located that it can be reached from any part of the plant in a few minutes.

N. A. D. A. Strongly Opposes Dumping

(*Continued from page* 775)

dustry recently has been threatened by the dumping upon the American market of thousands of vehicles and millions of dollars of automotive merchandise salvaged from the war areas of Europe, and

"WHEREAS, the carrying out of such a plan will result inevitably in the demoralization of the automotive industry, thereby further seriously disrupting employment, will cause the loss of thousands of dollars to manufacturers and dealers in automotive merchandise and will deprive the Government of great sums of revenue, therefore,

"BE IT RESOLVED, that the Congress of the United States be asked to enact legislation which will equalize the differences in the marketing of this salvaged equipment. affording protection to the Government as well as the industry and which will afford a much needed stabilization for all American business.

British to Stop Dumping

WASHINGTON, April 4—The Department of Commerce has been informed that the British government has issued formal proposals for the protection of key industries and the prevention of dumping. The plan contemplates the imposition of a customs duty of 33⅓ per cent ad valorem for five years on articles produced by key industries. The list includes magnetos. The government proposal says a further duty of 33⅓ per cent may be added to any other duties on goods offered below the production cost or at prices which, because of currency depreciation, are below production costs in the United Kingdom.

Wisconsin Proposes New Tractor Tests

Will Limit Sale of Machines to Those Meeting Working Requirements

MILWAUKEE, April 4—Agricultural department officials of Wisconsin have worked out a new plan for regulating the sale of tractors and all other forms of liquid fuel traction engines and machines, for the purpose of preventing further distribution of unreliable and untested tractors, and safeguarding the interests of purchasers, more especially the farmer.

Under a bill covering the plan, just introduced in the Wisconsin legislature, no tractors may be sold in Wisconsin without a permit to the manufacturer or assembler, and permits will not be issued until models have been tested by a board of three competent engineers under the control and supervision of the agricultural engineering department of the University of Wisconsin.

The measure is to go into effect Sept. 1 of this year so that as many models as possible may be tested and permits issued for them individually by Jan. 1, 1922. All models offered for test shall be regular, stock models. A permit is required for every model offered for sale. The tests include endurance, horsepower rating for continuous loads, and consumption of fuel per hour or per acre of farm operation. All test results will be open to public inspection.

Results of tests will be certified to the Wisconsin Railroad Commission which will issue the permits.

The commission shall revoke permits or refuse to issue any, if two or more bona fide customers residing in this State show evidence that the tractor manufacturer has failed to maintain adequate service with a full supply of parts and replacements in the state, and within reasonable shipping distance of the customers.

Temporary permits may be issued if by Jan. 1 all tests are not completed, but failure on the part of manufacturers to supply the models for testing shall not be cause for issuance of temporary permits.

Models not admitted may be re-examined after alterations are made. No company shall use the results of the tests for advertising purposes, except the entire report is published, under penalty of permit suspension.

For violations fines of $100 to $500 for each offense are provided in the bill. Hearings will be held on it in April at Madison, before legislative committees.

STUDEBAKER DIRECTORS CHANGE

JERSEY CITY, April 6—The annual meeting of stockholders of the Studebaker Corp. was held here yesterday. All directors were re-elected with the exception of G. M. Studebaker whose place was taken by H A. Biggs, vice-president in charge of sales.

24 Dealers Exhibit at Automobile Club

Closed Models Predominate at Special Showing — Minerva and Rolls-Royce Shown

NEW YORK, April 4—Twenty-four New York automobile dealers are holding a passenger car show this week at the Automobile Club of America. The stands occupy the grand ballroom, the restaurant, entrace hall and the office of the Touring Bureau. Many of the leading American makes are represented, as is one foreign car, the Belgian Minerva (the Rolls-Royce, also shown, may be regarded as an American product now). As might be expected, there is very little that is new, most of the cars shown having been exhibited either at the Automobile Salon or at the automobile show last January.

An Essex two-passenger cabriolet is a car that is exhibited for the first time, although literature regarding it was distributed at the automobile show in January. This car impresses one by its low build. The Hudson and Essex companies are now enameling their hoods and radiators in addition to their fenders and splash pans, which is a change made since last January. The Hudson company shows a standard touring limousine.

Space is naturally somewhat limited and where only a single car is shown, it is a closed car in the majority of cases. No exhibitor shows more than two cars, and then generally one open and one closed model Both Packard and Pierce-Arrow, for instance, have one touring model and one limousine on exhibition. The only chassis shown is that of the Belgian Minerva.

A new custom built brougham is shown on the standard Mercer chassis. While built low, it gives ample head room. It is a two-passenger brougham and sells for $8,500. Winton shows the same four-passenger sport roadster as at the Commodore some months ago. Two Rolls-Royce cars are shown, one a Salamanca cabriolet and the other a town car of English design, finished in yellow.

Dodge Brougham on Exhibit

A Dodge car with a brougham body is shown by the Stratton-Bliss Co., the New York Dodge agents. It is a rather attractive car and sells at $3,750, f.o.b. New York. Nickeled wire wheels are fitted and two extra wheels, tires and tire-covers are supplied. The wire wheels are of Hayes make. The equipment includes a dictaphone, dome light, individual cast aluminum steps, sliding steering wheel and special windshield; the latter being of square form, nickeled and rather low.

The only entirely new car at the show is the Ambassador, which is manufactured by the Yellow Cab Mfg. Co. of Chicago. It is an assembled proposition, comprising a Continental Model 8A motor, a Brown-Lipe clutch and transmission, Timken axles and Disteel wheels. Later, however, it is planned to use a special Ambassador design of engine, to be built by Continental. Only custom-built bodies will be supplied. The one exhibited was by Racine Body Co.

Among the special features is a double instrument board. That is, in addition to the regular instrument board on the cowl there is an instrument board at the rear of the front seat, for the benefit of the rear seat passengers.

Durant Reincorporates Under Delaware Charter

NEW YORK, April 6—Durant Motors, Inc., has been chartered in Delaware to succeed Durant Motors, Inc., the New York company formed by W. C. Durant to mark his reentry into the automobile field. The capital of the Delaware corporation is 1,000,000 shares of no par value stock.

The first of the Durant experimental cars have come through and are now being given thorough tests on the road. It will be August at the earliest, however, before the factories are put into production. Dealer territory will not be allotted for several months yet.

It has been announced that one of the Durant Motors assembling plants will be located at Jackson, Mich.

Briscoe Motors to Add $2,000,000 to Capital

TOLEDO, April 5—Clarence Earl, elected president of the Briscoe Motor Corp., Jackson, Mich., has told friends here that a new syndicate is to provide $2,000,000 additional capital for his company through a stock issue.

His plant is now employing 400 men and working on a nine-hour basis.

K. R. Jacoby, vice-president in charge of purchases at the Willys-Overland Co. until recently will also go to Briscoe.

Increases Capitalization

DOVER, DEL., April 4—The capital of the Briscoe Motor Corp. has been increased from $16,500,000 to $21,000,000.

LAUSON CUTS TRACTOR PRICES

NEW HOLSTEIN, WIS., April 2—Prices on Lauson tractors have undergone reductions ranging from $100 to $300. The $300 cut applies on models 15-30 and 15-25 farm and road building tractors, and the $100 cut is on the 12-25 high powered farm tractor. The latter model was placed on the market this spring, the sales price, $1,595, being now reduced to $1,495. The company announces that reductions are made possible by the increased quantity of business which is promised.

TO MAKE TRACTOR STEERER

DES MOINES, April 2—A new device, which it is claimed, will eliminate the need for an extra man on tractor drawn farm machinery has recently been placed in production by the Selia Mfg. Co. of this city.

Premier Motor Files New Incorporation

Capital Stock Is Reduced from $5,000,000 to $1,000,000— New Directorate Formed

INDIANAPOLIS, April 1—"Closer welding together of all interests of the old corporation and putting affairs of the Premier company in condition to carry out expansions contemplated" is the announced reason for the filing to-day of new incorporation papers of the Premier Motor Car Corp. Reorganization of the company has been going forward for the last two months, since the death of Dr. L. S. Skelton, president. Announcement to-day said the Skelton estate would continue the principal financial group in the corporation.

Statement issued by the company said that the capital stock had been decreased from $5,000,000 to $1,000,000, of which $500,000 is in preferred stock. The directors of the new corporation are B. L. Craig, B. H. Miller, C. B. Reynolds, J. A. Price, A. C. Perrill, J. F. Pancoast, N. P. Hutchinson, James Callans, I. F. Schaeffer, A. S. Beckett, M. A. Whipple. Whipple, Price and Pancoast, are attorney, administrator and representative of the Skelton estate, respectively. The statement adds that "representatives of the merchandise creditors, gold note holders, and minority stock holders have met with the Skelton interests at various times and the formation of this corporation is the outcome of their conferences."

The directors meet to-day and Friday for conferences with other financial interests. Officers will be elected to-morrow. A meeting of Premier distributors Thursday and Friday is expected to bring out some new factory policy announcements.

The new directorate represents varied interests as follows:

B. L. Craig represents creditors. He is owner of R. N. Collins Vehicle Wood-Working Co., St. Louis. B. H. Miller represents creditors. He is associated with the American Foundry Co., Indianapolis, and also represents Fletcher American Bank. C. B. Reynolds, representing creditors, is with B. F. Goodrich company.

A. C. Perrill, representing minority stockholders, is a stock broker, Chicago; James Callans, represents the Philadelphia Finance Co., financer of Premier dealers and owners; N. P. Hutchinson represents gold note holders; I. F. Schaeffer is secretary-treasurer of Premier; A. S. Beckett is assistant treasurer of the company. Schaeffer is the only remaining former director.

ERIE TIRE INDICTED

ERIE, PA., April 2—The Federal grand jury for the Western District of Pennsylvania has returned a true bill against the Erie Tire & Rubber Co. The company is charged with using the mails in a scheme to defraud.

Elections Benefit South African Trade

General Feeling of Business Confidence Follows Vote Favoring Constitution

JOHANNESBURG, SOUTH AFRICA, Feb. 28 (*By Mail*)—The General Election for the South Africa House of Assembly has turned the tide in favor of the existing constitution and the trade can, therefore, look forward with a greater degree of confidence than has been the case during the past few months, to the revival in full of the automobile industry in this country. Despite the fact that the vital issue at stake was decided little more than three weeks ago, signs are being seen of the renewed confidence.

This is especially so in country districts, and salesmen coming in from all parts confirm the fact that dealers are more inclined to buy than has hitherto been the case this year. Car sales do not show any marked tendency to increase, but the general feeling of satisfaction that exists throughout the trade places a very optimistic face on matters.

The Durban municipality has purchased nine Orwell electric trucks for various municipal services and one of these will shortly be operating in this city as a tower wagon. These vehicles are of British manufacture and are from 2 to 3½ tons capacity. They are very fast for electrics and are capable of 20 m.p.h. The year 1921 is going to be a bumper year for truck sales and traders are out to secure good business in this direction.

The commercial vehicle has come to stay. The S. A. Railways are using numbers of Clydesdale trucks in the Cape Province and trials have recently been carried out to test their capability under Transvaal conditions. Overloads were carried, but the trucks negotiated some extremely difficult roads without any concern. Some of the worst conditions possible out here were imposed during the tests which were eminently satisfactory.

The G. P. O. at Johannesburg are using Chevrolet, Ford and various electric models for collection purposes, and the same branch of the Government service at Pretoria has taken over a new Spacke model for similar purposes. It is anticipated that more of these cars will be put to the same purpose.

Consignments of the 1921 model Maibohm and Saxon have arrived. The former, as was expected, does not differ very materially from its predecessors, but the Saxon is very much liked in its new guise.

WASHINGTON TO BUILD ROADS

SEATTLE, April 4—Appropriations for highway work aggregating $12,490,000 were authorized by the Washington State Legislature which recently closed its sessions. This sum, with the $14,000,000 which the state is to receive from the Federal government for road work, gives Washington a healthy amount.

Of the amount appropriated by the legislature, $2,800,000 is for the maintenance of State highways outside the incorporated cities and towns and of streets in cities and towns through which primary highways pass.

The remaining $9,690,000 is to be spent mainly on new work, including grading and paving. While the actual details of how the $9,690,000 is to be spent will be left to the highway board, the bill which appropriated the money set forth the highways to be improved.

Ceylon Motor Exhibit Shows Light Car Trend

NEW YORK, April 5—A report that the Ceylon Motor Show, held in Ceylon from Jan. 22 to Feb. 2 this year was a complete success, has been received from Consul Keiser to the Bureau of Foreign and Domestic Commerce. A fair amount of business was done, although financial conditions prevented a normal sale, the consul states, and the attendance was so great that it was necessary to continue four days extra.

Sixty-nine cars and trucks were exhibited; 27 cars and 5 trucks were American, 22 cars and 8 trucks British, 2 cars French, 1 car and 1 truck Italian, and 2 cars and 1 truck German. American made tractors were the only ones demonstrated during the exhibition. The result of the sales made during the exhibition proves conclusively that the largest market in Ceylon is for a light weight touring model of 4 cylinders, these exhibits having attracted more attention than those of higher power and more expensive cars, the report adds.

Willys-Crossley Works Shows $562,000 Earnings

LONDON, March 11—(*Special Correspondence*)—Because of the acute situation in the British motor and other industries and the fact that many motor balance sheets are on the wrong side, it is noteworthy that the past year's report of the Willys-Overland Crossley works at Heaton Chapel, Manchester, shows a profit of £112,210 (about $562,000) which will enable 5 per cent dividend on the 10 per cent preference stock to be paid and a substantial sum placed to reserve.

TO SPEAK ON FOREIGN TRADE

CLEVELAND, April 1—In the present listing of speakers for the National Foreign Trade Council which meets here May 4 to 7 are these men who are connected with the automotive industries:

J. Walter Drake of the Hupp Motor Co., who will speak on "Government Service to Foreign Trade."

Col. Fred Cardway of the Packard Motor Co., on "Psychology of International Merchandise."

Frederick Dickinson of the Hupp Motor Co., on "Foreign Advertising."

Prices Undergo Cuts On British Market

General Movement Is Seen to Reduce Surplus Stocks—Guarantees Unpopular

LONDON, March 18 (*By Mail*)—The spring season here is being ushered in with some notable cuts in car prices. The American contingent, especially the larger sixes and fours, shows the most decided cuts, in most cases the cause being obviously to clear up the large accumulations of cars left over from the previous season. Many British firms are in the same position and are sacrificing stock to take advantage of expected cuts in material prices.

Price guarantees offered by some manufacturers through the dealers are proving unpopular. Many persons seem to be unsatisfied with this sort of proposition and are holding off buying. There is a good bit of business stirring, however, the real spring season being advanced almost a month by the fine weather obtaining.

The controversy between Harper-Bean Co. receivers and the British Motor Trading Corp., which had the distribution rights of the car, has been adjudicated in the courts, the distributers to sell cars at list prices and refund to the Bean company all but their agreed commission. It is believed in trade circles that the affairs of the Harper-Bean Co. will be straightened out, and it is reported that Sir George Bean has offered a substantial sum on his own account to help stabilize the company.

Business in automobile stocks has been better of late owing to the increased demand for vehicles. Another sign of improvement is the return of activity at Coventry, the Detroit of Great Britain. Among the leading motor stocks are Standard, Calthorpes, Rover, Humber, Singer, Swift. Austin and Star stocks are unchanged. Dunlop stock is steady and the new issue of debentures is selling at the price issued.

OCEAN FREIGHT RATES HIGHER

NEW YORK, April 4—Increases in freight rates on merchandise consigned to several European countries, amounting in some cases to 300 per cent, have gone into effect as the result of the settlement of an ocean rate war. The increases will apply to goods shipped to French Atlantic ports and to ports in Belgium, Holland and Germany. The rate on agricultural implements is increased from $2 a ton to $8.

FEDERAL TO BUILD NEW TRUCK

DETROIT, April 2—Federal Motor Truck Co. is coming through with a new 5-ton which is somewhat different from the present Model XE. The chassis price is $5350 and the engine is a Continental 4-cylinder 4¾ x 6 in. The gear ratio has been made such that the higher speeds are possible.

Arkansas Business Hit by Crop Prices

Little Rock and Hot Springs Report Buyers But Rural Districts Suffer

LITTLE ROCK, ARK., April 1—"Sixty days ago we had no prospects but we have plenty to-day. We sold two new and one used car last week." In these words L. E. Whitmore, local manager of the Cadillac agency, summed up the recent improvement in motor business in this city. Generally speaking the State of Arkansas is 60 per cent normal, if by normal is meant business the dealers and distributors had been counting upon.

Ford business is always a good barometer of the motor trade in a territory, and H. Bale of the Shoemaker-Bale Co., one of the two Ford dealers, says business has picked up unexpectedly in the last few weeks. This company sold 60 cars in March, which was double the sales for either January or February. The company is out of touring cars, and has not had sedans or runabouts for 15 days. Ninety per cent of these sales are in the city, and 10 per cent in the country territory.

The Ford truck business, which has been poor, is picking up, and sales are at the rate of 10 trucks per month. During 1920, Ford truck sales averaged 9 per month. Five have been sold in the last 30 days. The dealers of Little Rock generally agree that in all lines of motor cars business has improved in the last 30 days. Nearly all dealers other than Ford are stocked with cars, but such lines as Marmon, Nash, Paige and Packard have made recent sales.

The country dealer in Arkansas has very largely disappeared during the last five or six months. One distributor of a leading car had five agents a year ago of whom but two remain. Other distributors have but two to four dealers at present in the entire State. There is literally no business in the State outside of Little Rock, Hot Springs, where business has been particularly good during the present season, and a few other towns, notably in the northwest, which is the fruit section of the State.

Must Rebuild Organizations

The Arkansas distributors now face the problem of building up an organization of country dealers, but there is no hurry as the country and small town buyer is out of the market for most of the year, unless Europe should suddenly come into the market and furnish an outlet for cotton and rice. If this does not happen, the country buyer will not be back until the cotton and rice crops are well under way, and then the market price will be a considerable factor.

There is no question but that the oil fields of Arkansas are a certainty. Since the discovery of petroleum on Jan. 10 last, when the first gusher was brought in, 26 good wells have been brought in, and only two failures recorded. This is a record without parallel in petroleum history. The operations are largely in the hands of large oil companies and all Arkansas is agog to see where the next oil wells will be brought in. Drilling is becoming general in many parts of the State.

The highway building movement, which started in Arkansas three years ago, and which has proven a stimulant to the motor industry in the past, has practically ceased due to the shortage of money, caused by the inability to sell highway bonds. The State overstepped itself in this regard. The State Constitution will not permit of issuing State Bonds, neither can county bonds be issued. It has been necessary to create districts in which the farmers along the highways to be improved have issued bonds.

Country Dealers Quit in Southern Districts

TEXARKANA, April 2—One of the results of cotton selling at eight cents per pound, and the lumber business getting to prices approaching the pre-war level, is that this city with 25,000 population has only seven active motor car dealers, five having gone out of business since the boom of a year ago. Practically all of the seven now in business constitute the backbone of the industry here, some of them having been in business 10 to 12 years, in contrast with most of the five firms that have been eliminated that were in business scarcely a year, and some of them not more than four or five months.

This elimination of the small dealer in Texarkana has been greater in the surrounding territory, which largely depends on the cotton farmer. One local distributer, representing one of the best medium priced cars in the country, and who had eighteen dealers a year ago in his territory of 26 counties, has only three left.

As a result, motor car sales in the territory are practically nil, and in the city they have improved slightly within the last month. There is a tendency for the wealthy buyer in the city to hold back hoping for price reductions, and the man with a few hundred dollars is entirely out of the market. Several of the dealers have enough cars on hand to run sixty days, and in some cases ninety days, at the present rate of sales. The Ford dealer is out of runabouts, and expects to be out of touring cars in a few weeks. Too many of the dealers were heavily overstocked last fall. One dealer claims he sold more used cars in one month two years ago than he has sold during the last ten months.

LIFT GASOLINE RESTRICTIONS

NEW YORK, April 2—All restrictions upon the sale of gasoline in Italy have been removed by the Government. Service stations are being re-established in all the important centers on the Riviera, which will make motoring in Italy as popular as ever. Roads are in good condition, especially north of Rome.

METAL MARKETS

STEADY increase in the steel tonnages going forward to automotive plants is noted. The bulk of this material is still on account of releases of orders previously suspended. Interest in the market, however, has quickened considerably in the last few days and, while fresh orders are being placed cautiously and tonnages involved are light, the indifference that was characteristic of the attitude of most automotive purchasing agents a few weeks ago has completely vanished. In fact, with most of the steel producers a law unto themselves, when it comes to prices, the opportunity for securing advantages due to skilled search of the markets is greatly enhanced and astute buyers delight in such a condition where individual ability counts most. Mahoning Valley sheet markets, who a few weeks ago were reported to have withdrawn quotations in expectation of an upward revision, have quoted prices within the last few days that show their eagerness for business even though it be necessary to trim prices to the extent of 10 per cent. Aside from the automotive demand, there is virtually no activity in the steel market and it appears to be generally recognized that a marked increase in demand cannot be expected much before the third quarter of the year. The sheet rolling mills furnish perhaps the best indication to the manner in which the steel industry plans to meet this condition. Some of these mills have shut down entirely while others have reduced operations to approximately one-third of capacity. There are, however, enough mills left which are determined to "carry on" during the present quarter. They will be more than able to take care of the automotive demand and there promises to be a continuance of spirited competition for automotive business among these factors. The market for steel bars although still largely a single-car affair, is growing more active. Wall Street reports that the U. S. Steel Corp. will shortly announce a reduction in prices simultaneously with a reduction in wages, are nothing more than plausible conjecture.

Pig Iron.—Automotive foundries are ordering forward iron more freely. There is considerable talk of extraordinarily low prices in the Cleveland market but it is doubtful if No. 2 foundry has been sold at below $25 and malleable at below $25.50.

Steel.—New inquiries for small tonnages of cold-finished steel bars and cold-rolled strip steel are reported from automotive interests aside from liberal releases of old orders. Cold-rolled strip steel is offered at as low as 5.65c., Pittsburgh. Cold-finished steel bars are quoted at 3.00c., Pittsburgh. Several large sheet inquiries from Detroit passenger car builders are reported from Pittsburgh. Nothing definite can be learned regarding reported negotiations for the acquisition by the Ford Motor Co. of an Ohio alloy steel rolling mill.

Copper.—In spite of the shut-down of most of the large producers, a certain amount of output continues.

Aluminum.—The market continues quiet and unchanged in tone.

Tin.—The market seesaws fractionally at around 30c.

Lead.—Representatives of Spanish interests owning the Penarroya mines, are offering metal at 4.25c., New York. In the "outside" market 4.50c. is asked for spot dead, New York, which is $5 a ton above the chief interest's quotation.

Zinc.—The market continues dormant with metal obtainable at below 4.65c., East St. Louis, the price nominally quoted.

FINANCIAL NOTES

Kelly-Springfield Tire Co., directors have declared the usual quarterly stock dividend of 3 per cent on the common stock, but decided to omit the quarterly cash payment. The stock payment will be made May 2. The regular quarterly dividend of $2 a share on the 8 per cent preferred stock was also declared and will be paid May 16. Cash disbursements of $1 a share have been made on the common stock in addition to the stock dividend in each quarter for some time past.

International Harvester Co. has no intention of embarking upon a plan of refinancing, according to a statement by President Harold F. McCormick, who branded such reports as deliberate misrepresentations. The financial requirements for the year have been fully provided for, he said, and the maximum 1921 borrowings will not exceed two-thirds of the amount borrowed in previous years. All the foreign plants are being operated and export demand is heavier than usual.

Fisk Rubber Co. balance sheet for Dec. 31 shows total assets of $57,205,725.55, of which $20,888,163.40 is represented in inventories and $2,419,277.12 cash. The surplus of $7,789,085.45 represents a falling off from the surplus of $8,295,821.49 for the year previous. Dividends paid in 1920 totaled $2,561,739 and $235,700 was set aside for Federal taxes. Net sales for the year were $42,345,871.05. Net profits totaled $4,952.681. Inventory and contract losses written off totaled $2,669,117.38.

Perfection Tire & Rubber Co. stockholders will vote on April 13 on the proposition to create $5,000,000 8 per cent participating cumulative preferred stock and on changing the $1,500,000 common stock, par $10, to 150,000 shares of no par to be exchanged for old stock pro rata. Present production of the company is said to be 80 per cent of normal. The company is operating on a basis of $50,000 a month profit.

Timken-Detroit Axle Co. announces a total surplus of $17,820,062.16 and net profits for 1920 of $712,508.87 in its report as of Dec. 31. Total assets were $21,494,863.39, including $671,150.38 in cash and inventories of $10,932,521.39. Land, building and equipment account is given as $8,257,232.52. Current liabilities were $3,574,801.23, including $3,000,000 due in bank notes and $387,480.15 in accounts payable.

Hart-Parr Co., in a balance sheet as of Dec. 31, 1920, show total assets as $3,102,519.13, of which $215,189.36 is cash and $1,144,216.02 merchandise inventories. Loss on contract and purchase commitments will approximate $34,635 for which no provision has been made. A deficit of $131,923.90 is shown. The ratio of current assets to current liabilities is 5.5 to 1.

National Motor Car & Vehicle Corp., is offering through Ford Lambert & Co., New York, an issue of $1,200,000 8 per cent. five-year sinking fund gold notes, due April 1, 1926, at a price of 97½.

Spicer Mfg. Co. reports surplus after interest charges, depreciation, inventory adjustment and Federal taxes of $646,022, equivalent after preferred dividends of $1.29 a share earned on the 313,750 shares of no par value common stock outstanding.

Stutz Motor Car Co. shows total assets for 1920 as $8,052,522, of which $3,049,238 is inventory and $217,043 cash. Dividends payable are placed at $250,000 and reserves for all purposes at $618,238. The surplus shown is $5,404,414.

Moline Plow Co. creditors in charge of the plant have chosen F. O. Wetmore as chairman of their committee. The company has passed its preferred dividend because of the falling off in sales and slow collections.

American Bosch Magneto Corp., at the annual meeting returned all members of its board of directors and the directors re-elected all officers.

Goodyear Tire & Rubber Co. of Canada has passed its dividend for the current quarter on its preferred stock.

Liberty Airless Tire Corp. has purchased the Carey Tire & Rubber Co.'s tire plant at Carey, Ohio.

INDUSTRIAL NOTES

Atlas Crucible Steel Co. has moved its general offices, including general sales, to the Hanna Building, Cleveland, effective April 15. The company has extended its facilities and is now furnishing alloy steels as well as tool steels. Frank P. Case will be in charge of tool steels and Harry J. West in charge of alloy steels.

Wheel Trueing Tool Co., importers of industrial diamonds and manufacturers of diamond pointed tools, has moved its western office from Milwaukee to the branch office in Chicago. William J. Sansome will be in charge at the new location.

Gardner Motor Car Co., St. Louis, is now operating on a five-day week basis, turning out between 65 and 70 cars daily and employing 750 men. A total production of 2000 cars was made for the first quarter of 1921.

Kahler Co., New Albany, Ky., manufacturers of bodies for Ford cars, resumed operations this week after being closed down for fourteen weeks. The plant is on a daily production basis of 280 bodies.

Eco Co. has been formed in Boston for the manufacture of piston rings. The new corporation assumes all obligations of the Eco Mfg. Co. and the personnel and management will continue the same.

Miles Piston Ring Co., Chicago, has recently moved into its new factory. The company is adding additional equipment which will enable it to increase output.

Creditors to Decide Standard Parts Plans

CLEVELAND, April 6—Something of a definite nature regarding the future of the Standard Parts Co. is expected to develop at a meeting of the creditors of the company which will be held at the Hollenden hotel in this city April 12. The meeting has been called by F. H. Goff, president of the Cleveland Trust Co., who is chairman of the creditors' committee.

"This meeting has been called for a conference of the creditors of the Standard Parts Co.," Goff said to-day. "Reports will be submitted by Frank A. Scott and J. O. Eaton, the receivers as well as by the creditors' committee. The whole situation will be thrown open for discussion and creditors will be given an opportunity to express themselves as to the proper course to pursue."

It is understood that a plan will be submitted by the creditors' committee for the lifting of the receivership.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, April 7—The outstanding feature of the financial week was the continued marked improvement in the reserve position of both the New York Federal Reserve Bank and the Federal Reserve System as a whole. The shifting of credits in the central gold fund at Washington and the continuous stream of gold imports have favorably affected the New York bank in particular.

Last week the New York Federal Reserve Bank increased its gold reserves by $93,941,000, bringing the total up to $682,233,988, the largest total since June, 1919, and $238,000,000 above the figure of four weeks ago. Cash reserves increased $93,524,000; total bills on hand declined $68,967,000; total earning assets $70,542,000, and total deposits $3,362,000. While Federal Reserve notes in circulation increased $2,721,000, the ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 50.3 per cent to 56.7 per cent, the highest ratio attained since 1918.

The week-end statement of the New York Associated Banks reflected somewhat the results of the end-of-the-month settlements. The excess reserves over legal requirements at $14,285,300 marked an increase of $6,624,260, and loans declined $11,804,000, and net demand deposits increased $93,235,000.

A large increase in gold reserves was largely responsible for the improvement in the position of the Federal Reserve banks as a whole, but a substantial reduction in note circulation and in deposits was also an important factor. Gold reserves increased $35,674,000 and cash reserves $39,254,000, while total bills on hand declined $72,608,000, total earning assets $79,252,000, and total deposits $51,654,000. Federal Reserve notes in circulation declined $22,576,000 to $2,908,153,000, or $496,800,000 below the high of Dec. 22, 1920. Federal Reserve Bank notes also declined $5,768,000. As a result of these changes, the ratio of gold reserves to Federal Reserve notes in circulation, after setting aside 35 per cent against net deposits, increased from 60.7 per cent to 63.1 per cent. The ratio of total reserves to deposit and Federal Reserve note liabilities combined increased from 50.8 per cent to 52.4 per cent, the highest since the beginning of 1919.

The improved banking situation had no outward influence toward lowering interest rates. Call money was unchanged, with a range of 6 to 7 per cent and a ruling rate of 6½ per cent, with outside money said to be still available at lower rates than those quoted on the "board." A firm undertone, however, was evident near the end of the week—the result, probably, of the end-of-the-month settlement. The time money market was dull with few important transactions.

MEN OF THE INDUSTRY

W. L. Shaffner, for the last nine years connected with the B. F. Goodrich Rubber Co., has resigned to join the Acme Motor Truck Co., at Cadillac, Mich. Shaffner will be in charge of the national account division under the direction of Sales Manager C. J. Helm. Shaffner enjoys a wide acquaintance in the trade. For the last five years he has represented Goodrich in the manufacturers' division of the Detroit district. L. E. De Groat, formerly of Timken-Detroit Axle Co., is now with Acme in charge of dealer promotion work.

Charles S. Crawford has resigned as vice-president in charge of engineering at the Premier Motor Corp., Indianapolis, and has opened a consulting engineering office at 337 North Irvington Avenue, that city. He will consult on all Premier engineering work for the balance of the year. Crawford has been connected with the automotive industry since 1909 when he joined the Cole Motor Car Co. as chief engineer and assistant to J. J. Cole. He had been associated with Premier since 1916.

L. E. Warford, Seattle, well known in Pacific and Western States good roads and touring activities, has become associated with the American Automobile Association touring bureau at its New York headquarters. With his thorough knowledge of Western and Pacific Coast routes, obtained by actual touring contact, Warford will be able to supply first-hand information of especial value to interstate road travelers.

George T. Briggs, formerly in advertising and sales capacities with the Wheeler-Schebler Carbureter Corp. and the Sinclair Consolidated Oil Corp., has been made general manager of the Motorcycle & Allied Trades Association with headquarters at 326 West Madison Street, Chicago. The association has under way a "Do It With a Motorcycle Campaign" which includes national publicity in a number of mediums.

B. F. Jones has resigned as president of the Republic Rubber Co. because of ill health. He has been with the company only about a year and has given such close attention to its affairs during a period which has been critical for tire companies that his physical condition has been impaired in consequence.

W. J. Jamison, who has been superintendent of the Delco Light Co. plant at Dayton for the past five years, has been appointed factory manager of the Kelly-Springfield Motor Truck Co., succeeding L. P. Kalb, who resigned recently.

E. H. Roddy has joined the Barco Battery Company, Inc., manufacturers of the Bear-cat storage battery, as general superintendent. Roddy formerly was with the Electric Storage Battery Co. and also the Philadelphia Storage Battery Co.

J. C. Kearns has been appointed acting sales manager of the Republic Rubber Corp., following the resignation of H. J. Woodard as vice-president in charge of sales. L. M. Barton has been appointed manager of pneumatic tire sales.

J. J. Moriarity has been appointed factory manager of the Victor Rubber Co., filling the vacancy caused by the resignation of Frank R. Talbott. Moriarity was formerly connected with Republic Rubber Co. and with Firestone.

Willis T. Behoteguy has been named manager of all tires sales with the Goodyear Tire & Rubber Co., succeeding H. G. Palmer, who retires because of ill health. F. L. Morgan is made manager of automobile tire sales

E. S. Beggs at Long Beach, Cal., has been made sales manager of the Planet Mfg. Co. of Detroit, manufacturers of a carburetor attachment.

F. H. Hearsch has resigned as San Francisco district manager of the Kelly-Springfield Tire Co. His plans for the future are not announced.

J. Harold Kraus, Jr., formerly of San Francisco, has joined the sales department of Bantam Ball Bearing Co., Bantam, Conn.

Nine Manufacturers Affiliate with A.E.A.

CHICAGO, April 6—At the mid-convention meeting of the Automotive Equipment Association a committee was formed to handle the show at the Coliseum in November, which consists of: N. H. Oliver, chairman, Illinois; William Von Elm, vice-chairman, New York; Charles C. Gates, Colorado; W. E. Wissler, Iowa; W. H. Parkin, Michigan.

The following new members were admitted: Jobber—Sheridan Auto Supply Co., Chicago. Manufacturers—Adams & Elting Co., Chicago; Bowen Products Corp., Auburn, N. Y.; Graton & Knight Mfg. Co., Worcester, Mass.; S. C. Johnson & Son, Racine, Wis.; Las-Stik-Patch Mfg. Co., Hamilton, Ohio; Standley Skid Chain Co., Boone, Iowa; Vogt Mfg. Corp., Rochester, N. Y.; F. W. Wakefield Brass Co., Vermilion, Ohio; Western Vulcanizer Mfg. Co., Chicago.

President Robert A. Stranahan was made chairman of a committee to promote trade relations.

A steamship will leave Chicago, June 18 to carry members from tributary sections to Mackinac Island. William Von Elm is handling arrangements for a boat to leave Buffalo, Cleveland or Detroit to carry members from the east.

The question of manufacturers or jobbers entering local shows was covered by a resolution requiring the sanction of the advisory committee or local jobbers.

Franklin Net Profit for 1920, $2,235,625

SYRACUSE, April 4—In the annual report by the H. H. Franklin Mfg. Co. of Syracuse, net profit from sales for the past year is shown as $2,235,625.20. From this total was deducted depreciation of inventory to market value at the close of the year, write-off of development expenses and obsolete stock, and miscellaneous adjustments, which leave the net income of the business at $831,514.99, before Federal taxes. After deducting these taxes, the addition to surplus for the year totals $696,514.99.

Total sales for 1920 aggregate $28,585,398 including cars, spare parts and die castings. This figure compares with $22,811,889 the previous year.

During March, 1005 cars were shipped from the Franklin plant, this being the full output of the factory. Since Feb. 10, the factory has operated at 100 per cent normal (or at the rate of 40 cars per day) and from that date up to April 1 has shipped a total of 1765 cars.

Orders for 843 cars for April delivery were already on hand on April 1.

Edge Would Speed Aid to Export Business

WASHINGTON, April 6—Of the utmost significance to the automotive industry is the proposal of Senator Edge of New Jersey to amend the so-called Edge Act in order that the $100,000,000 Foreign Trade Financing Corp. may operate immediately. The original legislation which the Senator sponsored required that 25 per cent of the capital should be paid in before activities could start.

The Senator proposes an amendment, it is said, which will allow the foreign trade financing organization to function with the requirement to call up their total capital stock at certain specific periods. The proposed amendment would liberalize this proviso yet provide essential safeguards. With the slump in the volume of American export business in automotive products, all efforts to assist market development will have an important bearing on production.

New Tariff Effective When Sent to Congress

WASHINGTON, April 6—While the tariff is not as important to the automotive industry as internal revenue revision, it is interesting to note, in view of increased imports of foreign cars, that it is proposed to introduce a joint resolution making the permanent tariff schedules effective from the day the drafts are reported to the House. This resolution, if passed, would automatically increase the price of foreign cars provided of course, higher rates are enacted.

It is understood that this resolution will be reported from the House Committee on Ways and Means soon as a form of interim legislation. The resolution would be in accordance with recommendations of the Tariff Commission under which duties would attach themselves to imports though the actual rates had not been approved by the Congress. As Chairman Fordney plans to introduce the permanent tariff by May the new schedules would become effective as of that date.

MEETING AGAIN POSTPONED

AKRON, April 4—The meeting of Goodyear stockholders scheduled for Wednesday to definitely ratify the company's reorganization plans and refinancing negotiations for $85,000,000, has been adjourned again until April 11.

Calendar

FOREIGN SHOWS

April 16 - May 8—Bosquet, Algiers; Algerian Agricultural Fair, Motor Cars, Machinery and Tractors.

Apr. 20 - May 5 — Mexico City, Mexican Automobile Show, National Theatre Bldg.

April, 1921—Sofia, Bulgaria, Tractor Trials, under the Bulgarian Ministry of Agriculture.

May 28, 1921 — Czecho-Slovak International Automobile Exposition of Cars. Trucks, Tractors, Motorcycles and Equipment. Prague.

May 28-June 8—International Automobile Exhibition, Basle, Switzerland.

June, 1921—Reykjavik, Iceland, Agricultural Exhibition—Agricultural Machinery—Icelander Agricultural Society, Reykjavik, Iceland.

September—Buenos Aires, Argentina. Passenger Cars and Equipment. La Pabellon de las Rosas. Automovil Club Argentino.

September — Buenos Aires, Argentina, Cars, Trucks, Tractors, Farm Lighting Plants and Power Farming Machinery. Palermo Park; Sociedad Rural Argentina.

September—Luxemburg, Luxemburg Agricultural Sample Exhibition.

Oct. 5-16—Paris, France, Paris Motor Show, Grand Palais, Administration de l'Exposition Internationale de l'Automobile, 51, Rue Pergolèse, Paris.

Nov. 4-12 — London, British Motor Show, Society Motor Mfrs. and Traders.

CONVENTIONS

May 4-7 — Cleveland, National Foreign Trade Council.

May 17-19—Buffalo, Convention of Factory Service Managers, Auspices of Service Committee, N. A. C. C.

May 24-28 — West Baden, Ind., Summer Meeting Society of Automotive Engineers, West Baden Springs Hotel.

July 4-9 — Mackinac Island, Mich., Summer Meeting Automobile Equipment Association.

Oct. 12-14, 1921—Chicago Twenty-eighth Annual Convention National Implement & Vehicle Ass'n.

RACES

June 18—Uniontown, Pa., Speedway Events.

July 25—Grand Prix, Le Mans.

Labor Day—Uniontown, Pa., Autumn Classic.

S. A. E. MEETINGS

Buffalo section—April 19—Paper on "Carbureter Performance," by F. C. Mock.

Dayton section—May 3.

Metropolitan section—April 14—Paper on "Low Grade Fuel Carburetion," by A. H. Beach.

Minneapolis section — April 6 — Discussion of repair equipment.

Washington section—April 1—Aeronautical Engineering Session.

N. A. C. C. Questions Paris Show Ruling

NEW YORK, April 4—According to the application blanks just received, certain restrictions have been placed upon prospective exhibitors of American motor cars at the Paris Automobile show next fall which the American manufacturers believe is hardly in line with the co-operative spirit that has been shown on this side of the water, especially following the request of the National Automobile Chamber of Commerce for a reduction in the tariff on foreign cars coming into this country.

The restriction which is felt to aim particularly at American manufacturers reads as follows:

"Manufacturers belonging to allied nations are admitted on the same terms as French firms, provided they have taken part in three previous Paris shows and on condition that their pre-war import duties were not more than 15 per cent ad valorem."

Under such a rule American firms do not have the same choice for space as British, Belgium, and Italian manufacturers.

Not Proper Show Condition

At the N. A. C. C. offices it was said that little objection could be raised to a rule which required all exhibitors to have taken part in at least three previous shows although no such rule is enforced at the American exhibitions to which foreign cars have always been welcomed, the question has been raised whether the question of duty properly comes under the show conditions, especially when such limitation may prevent a fair presentation of American products, many of which have been sold abroad for years.

It was pointed out that at present the tariff on motor cars coming into this country is 30 per cent on cars valued at $2000 or less and 45 per cent on cars selling at more than $2000. The manufacturers of cars and trucks in the N. A. C. C. voted unanimously to request Congress to reduce the tariff to 30 per cent so that all cars may come in on the same basis.

In this connection it was requested of the authorities at Washington to offer this reduced rate in all cases where our products going into a foreign country are treated the same as the cars imported from all other countries.

Sunbeam Builds Special for Indianapolis Race

LONDON, March 12, (By Mail)—The eight-cylinder-in-line 3-litre Sunbeam to run at Indianapolis has commenced its tests at Brooklands. Although no details of the design are yet available, the following general particulars can be given. It has a bore and stroke of 65 x 112 m.m. and is said to develop something like 130 b.h.p. There are four overhead valves per cylinder, and four Claudel carbureters are fitted with their intake pipes projecting through the right side of the hood, matching the exhaust outlets on the left.

No flywheel is used, this item being considered unnecessary in view of the heavy balanced crankshaft. Delco ignition is depended upon, and while only rear wheel brakes are fitted to this particular car, the three sister cars for the French Grand Prix have front wheel brakes in addition. In another respect, also, the Indianapolis and Grand Prix cars differ, for in the former the chassis as a whole is not set centrally on the axles, being appreciably nearer to the left hand wheels than to those on the right, this arrangement having been adopted to assist cornering towards one side at high speeds.

The frame is very considerably upswept over both axles and thus gives the car an extremely low appearance.

FOX OUT AS GUN MAKER

PHILADELPHIA, March 28—Ansley H. Fox, president of the Fox Motor Car Co. has not been connected with the A. H. Fox Gun Co. for several years, although he invented the Fox shot gun.

Argentine Expositions to Be Repeated in 1921

NEW YORK, April 5—The announcement of two important automotive exhibitions to be held in Argentina was made to-day by EL AUTOMOVIL AMERICANO, the Spanish automotive publication of the Class Journal Co. These exhibitions, the first of which will take place the first two weeks in September, will be the annual cattle and agricultural show of the Sociedad Rural Argentina and the second, which will be held later, will be the annual automobile show of the Automovil Club Argentino.

These snowings are perhaps of more importance to automotive manufacturers than any others held in Latin-America. They are both well established, well managed and draw large attendance from all parts of Argentina, Uruguay and some of the other countries adjacent to Argentina. The agricultural exhibition of the Sociedad Rural Argentina takes place in the grounds of the association in Palermo, at Buenos Aires, and the best products of the Argentine ranches are brought there for show. Immense crowds attend, and while not exclusively automotive, it is an excellent opportunity to display passenger cars, motor trucks, tractors, farm lighting plants and other equipment.

Will Be Fourth Car Show

The show of the automobile club was held for the third time in November of last year in a fine building known as the "Pabellon de las Rosas" and the announcement that it will be repeated during 1921 should be of wide interest to the trade. Passenger cars and accessories are shown and the Chamber of Commerce of the United States in the Argentine Republic is authority for the declaration that practically every American and European car represented in Buenos Aires is on exhibition.

The plan of holding automotive shows throughout Latin-America is increasing rapidly, according to EL AUTOMOVIL AMERICANO.